

DISCONTINUED

Atlas

**PARTS LIST FOR
ATLAS MILLING MACHINE**

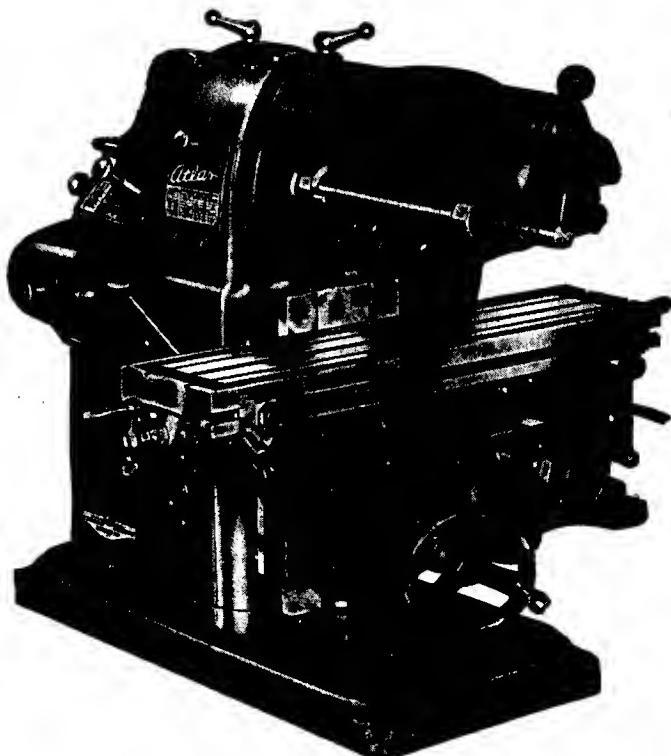
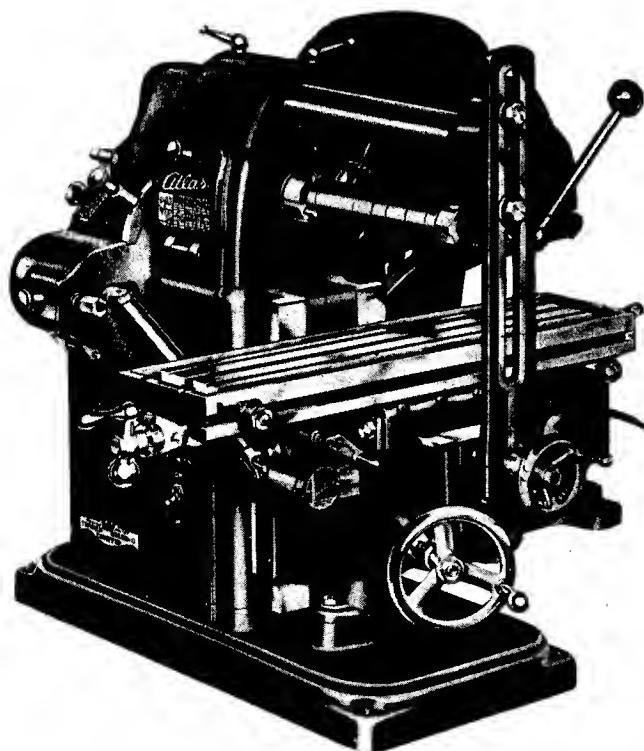
OCTOBER 1962
MILLING MACHINE BULLETIN MMB-5
Replaces Bulletin MMB-4

For Models MFC, MIC and MHC see pages 2 - 8.

For Models MFB, MIB and MHB see pages 2 - 8 and 13.

For Models MIA, MIA-G, MFA, MFA-G, MHA, and MHA-G see pages 9 and 10.

For Models MI, MI-G, MF, MF-G, MH, and MH-G see pages 11 and 12.



OPERATING INSTRUCTIONS

MILLING MACHINE INSTRUCTIONS

All the equipment furnished with the Milling Machine is packed in the carton in the miller crite. Be sure everything has been removed before the cartan is destroyed.

Use kerosene to remove the rust preventive coating from the machined surfaces.

Before using the Milling Machine, lubricate thoroughly according to instructions in Lubrication Chart, page 6.

MOUNTING MOTOR

The Atlas Milling Machine requires a $\frac{1}{3}$ HP, 1725 RPM motor, preferably a capacitor or repulsion-induction type. (For a $\frac{1}{2}$ -inch diameter motor shaft, motor pulley No. 9-428 is required.)

Make all wiring connections before fastening motor to motor base. Motor must rotate counterclockwise when viewed from the end of the motor opposite the shaft — Figure 1 shows the correct hook-up for either 110V or 220V current.

Slide pulley on motor shaft so that small step is next to motor; tighten pulley set screw. Mount motor on motor base, place belt around small step of countershaft pulley and large step of motor pulley, aligning motor until belt is straight and adjusting motor base until belt is tight. Bolt motor in this position. **IMPORTANT:** Maintain proper belt tension — belt should be just tight enough to prevent its slipping.

Mount the Milling Machine to a sturdy level bench. Level the Miller using a machinist's spirit level. To do this, check with level on each end of Miller table at right angles to table travel; and also in center of table parallel to table travel. By placing thin metal shims or washers around mounting bolts beneath miller base, adjust until level

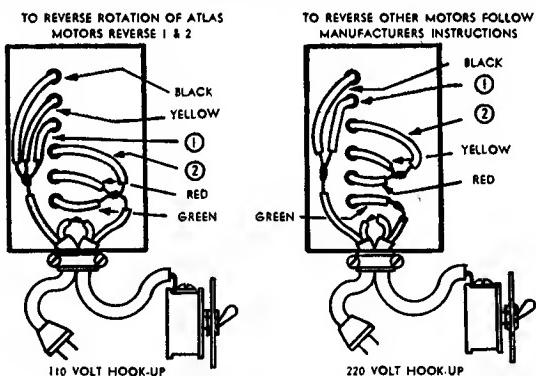


Fig. 1 Wiring hook-up for Atlas motors.

readings show that miller table is level. Slight variations may be corrected when tightening mounting bolts. Bolt miller securely in position, tightening each bolt a little at a time, rechecking level reading every few turns.

OPERATIONS AND CONTROLS

POWER FEED MODEL—see Figure 2.

A. ARBOR SUPPORT ARM LOCKS — The arbor support arm is adjusted and held in position by means of coordinate locks actuated by handle A.

B. REVERSE TUMBLER LEVER — controls the direction of table travel. Has three index positions — forward, neutral, and reverse.

C. CHANGE-O-MATIC INDEX KNOB — indexes the change gears in four different positions. Pull out knob and rotate change gears by means of large knob, located below index knob, until index knob drops into position.

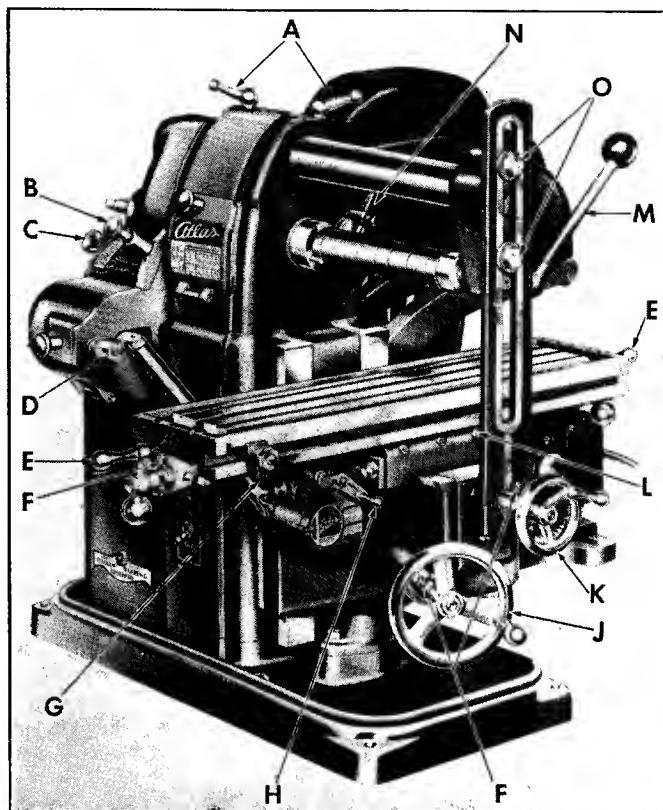


Fig. 2 Atlas Power Feed Model Milling Machine.

CHANGE-O-MATIC KNOB (See Fig. 7) — rotates change gears so that anyone of the following four feeds are obtained; .003", .006", .0125" and .025". For further information regarding feeds, see **READING THE CHANGE-O-MATIC DIAL**, page 3. Always pull out index knob before changing feeds.

D. UNIVERSAL DRIVE GEAR LOCK NUT — The four table feeds per revolution of spindle are considered enough for most purposes. Other feeds are obtained by using different gears on the universal drive shaft in place of the standard 64-tooth gears. Loosen the lock nut D to make the necessary gear mesh adjustment.

E. TABLE FEED HANDLES — used to move table by hand. Always loosen gib lock L before moving table.

F. MICROMETER DIAL LOCK SCREWS — used to lock the micrometer dials at the zero reading. Each division on the dial represents one thousandth of an inch travel. Always remove back lash before setting collar.

G. KICK-OUT — automatically disengages the table travel when in power feed by tripping kick-out lever H. Kick-out may be set at any position along the table.

H. KICK-OUT LEVER — engages power to the table. Power is transmitted to the table by lowering the lever. Lever may be disengaged at any time. **CAUTION:** Be sure to disengage lever before table reaches its limit of travel. Serious damage may result if table is jammed against the cross slide.

J. TABLE LIFT HANDWHEEL — controls the table elevation. Always release gib lock located on right side of knee, and the two lock screws O before positioning table.

K. TABLE TRANSVERSE HANDWHEEL — controls the forward and backward movement of the table. Always release gib lock located on right side of cross slide and the two locks A before positioning table.

L. TABLE GIB LOCKS — be sure to tighten locks on feed not in motion (longitudinal, cross or vertical).

CAUTION: The table gib lock located on front of saddle, Power Feed Model (MFC), should always point downward to prevent it striking the kick-aut.

M. BELT TENSION LEVER — shift lever to the right to tension belt for operation. For belt adjustment, see ADJUSTMENTS, part 2.

N. BACK GEAR LEVER — engages back gears with spindle gears. After back gears are engaged be sure to pull out sliding pin which locks the large spindle gear to the spindle pulley. Use the special wrench furnished.

When back gears are disengaged be sure sliding pin is replaced in the large spindle gear.

O. ARBOR SUPPORT LOCKS — be sure screws are tightened securely when using the cutting arbor for milling operations. Always loosen screws when positioning table.

HAND FEED MODEL—See Figure 3.

See POWER FEED MODEL for controls not listed below.

P. TABLE STOP — can be set anywhere along the length of the table to stop table at any desired point. Set screw provides vernier adjustment.

LEVER FEED MODEL—See Figure 4.

See POWER FEED MODEL for controls not listed below.

P. TABLE STOP — can be set anywhere along the length of the table to stop table at any desired point. Set screw provides vernier adjustment.

R. TABLE FEED LEVER — used to move table for milling operations. The crank handle furnished moves table its full length of travel.

S. TABLE LIFT LEVER — controls the table elevation. The crank handle is also used to raise or lower table. Always release gib lock, located on right side of knee, and the two lock screws O before positioning table.

T. TABLE STOP COLLARS — regulates table travel. Adjust collars to length of travel desired and lock collars in place.

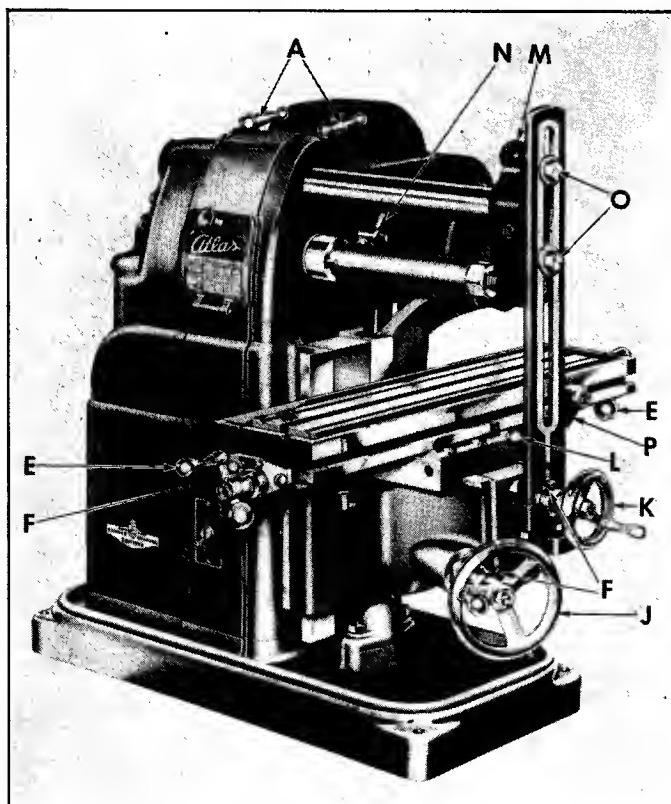


Fig. 3 Atlas Hand Feed Model Milling Machine.

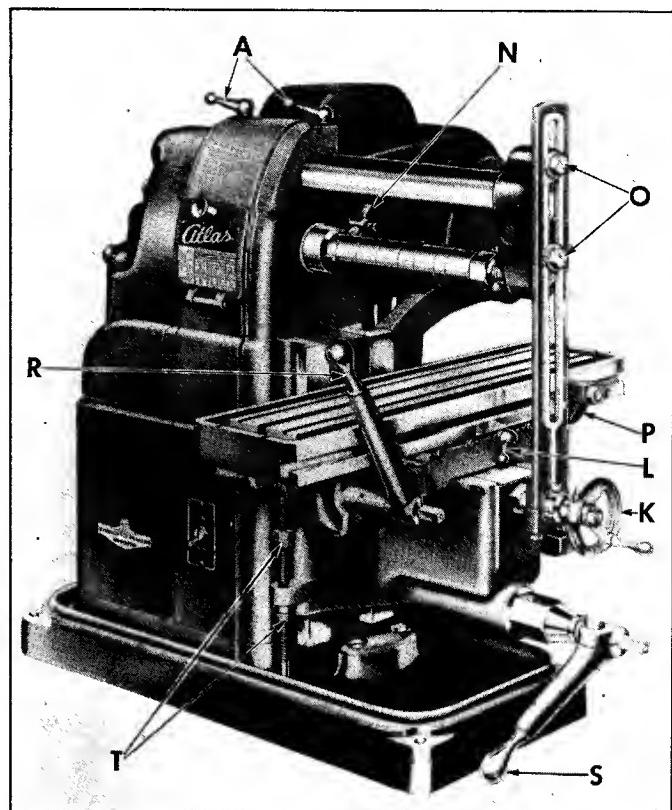


Fig. 4 Atlas Lever Feed Model Milling Machine.

ADJUSTMENTS

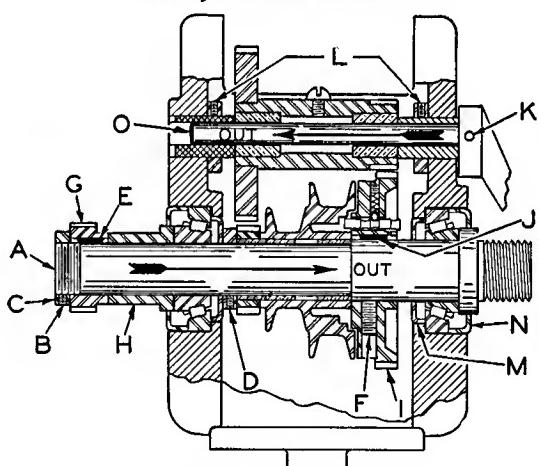


Fig. 5 Cross Section of Miller Head.

The following applies to all models:

1. SPINDLE ADJUSTMENT.—Adjustment of the Timken Bearing is not often necessary, but if the spindle spins too freely or play is noticeable when the spindle is pushed back and forth, the following simple procedure will adjust the bearings:

Run the miller between thirty minutes and one hour to warm up the spindle (a temperature rise of 50 degrees Fahr. increases the length of the spindle about .002 inch between bearings). Then loosen the set screw (B) on the thrust nut (C), at the extreme left end of the spindle (A), see Figure 5, and turn it up to a point where no play can be detected in the spindle. Advance this thrust nut $\frac{1}{32}$ turn (equal to one tooth of the spindle gear) past that point in order to provide the correct preload. Tighten the set screw. It is necessary to remove change gear guard on rear of miller to get at the adjusting collar. This is easily accomplished after loosening the hex screws.

2. BELT TENSION:

(a) Spindle belt — Two headless set screws located on the countershaft housing serve to take-up belt slack. When adjusting these screws, put belt tension lever in tension position and relock screws after adjustment is made.

(b) Motor belt — Tension on this belt is decreased or increased by moving the motor base up or down. This is accomplished by turning the two hex nuts located on the stud which goes through the upright.

on the matar base. After adjustment is made, lock nuts in place.

Cautian: Da nat have belt too tight, just enough tensian to prevent its slipping.

3. TABLE AND CROSS SLIDE:—It is very important that the gibbs an the table and cross slide always fit snugly and that all play is absent. Gib adjusting screws are provided far making any necessary odjustment. The gib screws should always be locked in place with the hex nuts after adjustment is made. The table and crass slide should move with a slight "drag" effect. If any play is present, chattering cuts and rough finishes will result.

4. KNEE:—The knee gib should also fit snugly at all times, but nat sa tightly that the knee cannot be moved without difficulty. Always lock set screws in place after adjustment is made.

No play should ever be present in the knee slides. Shims between the knee and knee anchor plates afford necessary take-up odjustment. The shims are .010" thick and made up of (4) .002" and (2) .001" leaves held together with o light film of salder ond can easily be separated with a knife blade. See Fig. 6. The .001" side is calared grey.

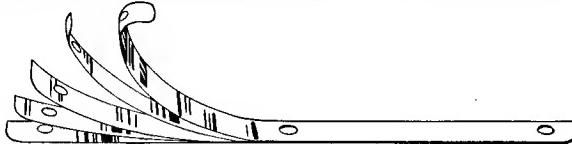


Fig. 6

SPINDLE SPEED-CHART

A speed-chart located on the side cover plate on the head of the miller shows all the speeds available ond the belt set-ups to obtain them.

TABLE FEED PER REV. OF CUTTER

Table feed is the distance the table travels per one revolution of the cutter.

The table feed depends mainly upon the number of teeth on the cutter and for this reason the feed will vary for each cutter.

In general, the table feed should be less for the same material when a cutter with a few number of teeth is used than with many teeth. The hardness and type of material also are determining factors to be considered.

READING THE CHANGE-O-MATIC DIAL

Four different table feeds per revolution of cutter are available on the Change-O-Matic. These feeds are shown in each case under the title "Feed Per Rev." After the proper table feed has been decided upon, set the Change-O-Matic so that the nearest approximate table Feed per Rev. appears through the dial window.

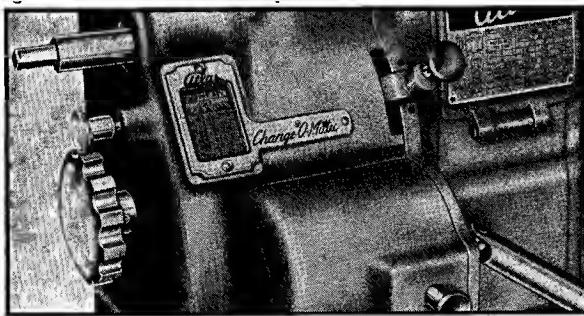


Fig. 7

Below the "Feed Per Rev." are two columns, one showing the R.P.M. and the other the Feed in inches per minute. After the proper cutter speed has been obtained in R.P.M., as explained under "Cutter Speed," refer to the R.P.M. column and choose the nearest approximate R.P.M. shown. The adjacent number in the "Feed" column will show the distance the table will travel in inches per minute of that particular spindle speed. By dividing this figure into the length of the portion to be milled, the time required for milling can easily be determined.

There is a total of 20 different table feeds per minute on the Change-O-Matic dial. Da not confuse "Table Feed Per Rev. of Cutter" with "Table Feed Per Minute."

CUTTER SPEED

The cutter speed is the amount of material removed linearly by the cutter per minute and is usually expressed in feet per minute; that is, the circumferential speed per minute of the outside of the cutter. The cutter speed is determined by the size (dia.) of the cutter, and of course, other factors, such os: hardness of the material to be milled, type of operation, etc.

The following simple rule will prove practical in most cases for arriving at the proper cutter speed in R.P.M.

(o) Take the circumference of the cutter to be used, expressed in inches (Cir. = $3.1416 \times \text{dia.}$) and divide it by 12. Then, divide the quotient into the recommended cutting speed in feet per minute for the particuler material to be milled (see chart below). This will give the cutter speed in revolutions per minute.

$$\text{Cutter Speed in RPM} = \frac{\text{Cutter Speed (in FPM)}}{\text{Dia.} \times .262}$$

In general, the obave rule will prove satisfactory but the following things should also be kept in consideration when determining cutter speed.

(o) In T-slat milling operations, the table feed per minute should be reduced considerably (about $\frac{1}{2}$) due to the great amount of friction present in this type of milling operation. If the feed is not reduced, the cutter will become excessively hot, and be ruined.

(b) The harder the material, the slower should be the feed per min.

CUTTING SPEEDS FOR VARIOUS MATERIALS

MATERIAL	HIGH-SPEED STEEL FEET PER MINUTE
Cast Iron, 160B*	70-80
Malleable Iron	75-95
1020 S.A.E. Steel	75-95
1050 S.A.E. Steel	70-80
3145 S.A.E. Steel	60-70
Tool Steel, annealed	50-55
Steel Castings	65-75
Yellow Brass	200-500
Bronze, 40R †	200-350
Bronze, 75R †	75-95
Aluminum	800-2500

* Approx. Brinell hardness number

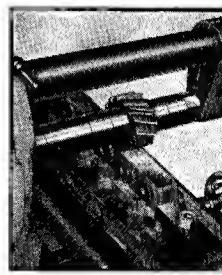
† R = Rockwell B scale

SELECTION OF CUTTER

The type and size of cutter to use depends entirely upon the shape of the piece to be milled. Some operations would require slab milling (Fig. 8); others, end milling, such as cutting a slot (Fig. 25); or dovetailing (Fig. 11 and 12), in which case a dovetail cutter is used. One very importont thing should be kept in mind: When selecting a cutter the size should be the smallest permissible to perform the operation. The larger the cutter the more power it takes to drive it.

MILLING OPERATIONS

1. PLAIN MILLING OR COMMON, SLAB OR SURFACE MILLING: For this type of milling operation a plain milling cutter is used. A plain milling cutter is one which machines surfaces parallel to its own axis of rotation. The cutting teeth are only on the periphery of the cutter. The cutting teeth on some plain milling cutters are parallel to the axis of the cutter; others have helical edges which have an advantage over the parallel edge type because the full cutting edge of the tooth does not contact the work at the same time but rather the cut commences at one corner and gradually proceeds across the work in a shearing-like action, thereby resulting in much smoother cutting action. (See Fig. 8.)



Another type of cutter which falls under the plain milling cutter classification is the metal slitting saw.

This cutter is used for the following operations: slitting and slotting, cutting small keyways (Fig. 10), and cut-off operations.

2. SIDE MILLING: In side milling, the sides of the cutter cut as well as the face. Therefore, the cutter is similar in design to the plain milling cutter except for the additional teeth on the side. This cutter is used for such operations as slotting, grooving, cutting keyways, etc. (See Fig. 21.)

Side milling cutters placed on on arbor with a spacer to regulate the distance between them permits two sides of the work to be operated on at the same time and is known as "straddle milling." (See Fig. 9.)



If a combination of side and plain milling cutters are used on the arbor at the same time, this is called "gang milling."

3. T-SLOTTING: In this case a T-slot cutter is used. The straight slot is milled first with a side mill cutter and then the T-slot cutter is used to complete the job. Do na confuse a T-slot cutter with a keyway cutter. The twa differ in this respect that the

T-slot cutter has cutting teeth on the sides as well as the face while the keyway cutter has teeth only on the face.

4. CUTTING KEYWAYS:—Woodruff keyways are cut with a keyway cutter. The cutter is brought down into the work to the desired depth. The depth of the cut, of course, depends upon the size of the keyway. Bring the work, after it has been mounted properly, so it just touches the cutter. Tighten the gib locks on the table and cross slides. Set the micrometer dial on the knee lift shaft to the zero reading. By watching this dial as the work is advanced the correct depth of cut can be determined.

To cut a keyway along the entire length of a shaft, a side mill is used. If the keyway is not very deep, a slitting saw may be used.

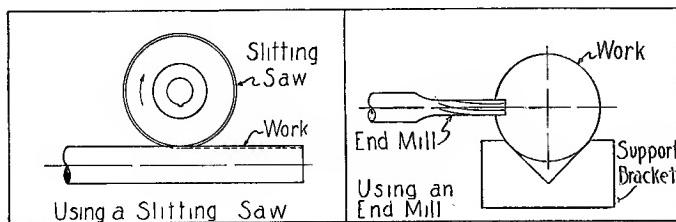


Fig. 10

Since a slitting saw has no cutting edges on the sides much friction is set up between the sides of the cutter and the work. Therefore, caution should be exercised to prevent the cutter from "burning up". (See fig. 10.)

Another way to cut keyways is by using an end mill. (See fig. 10.) An end mill cutter has cutting edges on the end as well as on the face. In many cases an end mill cutter has to be used because it is not permissible to use a slitting saw due to the shape of the work. For example, a shaft with two different diameters but only the smaller one is to be keywayed. The cutter would cut partly into the larger diameter portion of the work as it approached the end of the cut.

5. DOVETAIL CUTTING:—For dovetailing it is necessary to use an angular cutter. (See fig. 11.) There are single and double angular cutters. The single angle type, like the one used for dovetailing, has one cutting face inclined at an angle to the axis of rotation of the cutter. A double angled one has two surfaces at an angle to the axis of rotation and are usually used for fluting tapers, reamers, and similar work where it is important that two surfaces operated on at the same time are finished equally well.

When cutting the male dovetail, (see fig. 12), it is advisable to first mill the top surface of the work and then mill the sides with a side mill to the proper width. Finish the job with the dovetail cutter. First cut the one side. Then, without moving the work forward or backward, raise or lower the work, depending upon which side was



Fig. 12

milled first and without changing the rotation of the cutter, mill the other side by feeding the work against the cutter in the opposite direction.

The two sides of the female dovetail are also cut in the same way; that is, leave the cutter rotation the same and feed from opposite directions. (See fig. 11.)



Fig. 13—BORING

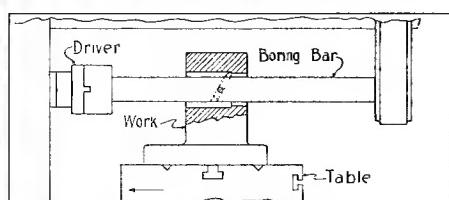


Fig. 14

6. BORING:—For boring, a special arbor with an inserted cutting bit is used. (See fig. 14.) If the work can be bored close to the head of the miller, the use of a short shank arbor is permissible (see fig. 13); otherwise the arbor should be of such a length so that the arbor support bracket can be used to support the other end.

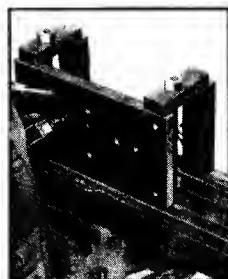


Fig. 15
DRILLING - LAYOUT

7. DRILLING - LAYOUT:—By using a chuck mounted on the miller spindle and a center drill, work can be accurately prepared for drilling. (See fig. 15.)

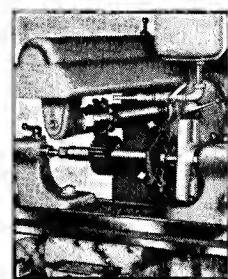


Fig. 16
GEAR CUTTING

HOLDING THE WORK

In many cases the work can be clamped directly to the milling machine table. Since pieces to be milled are of such various sizes and shapes, no definite instructions can be given as to mounting and much depends upon the ingenuity of the operator along this line. Just a few suggestions are given here which may be of some help.

The V grooves in the table facilitate the easy clamping of round stock to the table. The grooves are parallel to the line of the longitudinal table travel. Fig. 17 shows a set-up for milling a keyway into a shaft with an end mill. The shaft is clamped down by means of clamp bars resting on the work and spacer blocks under the other and fastened to the table by tee-bolts.

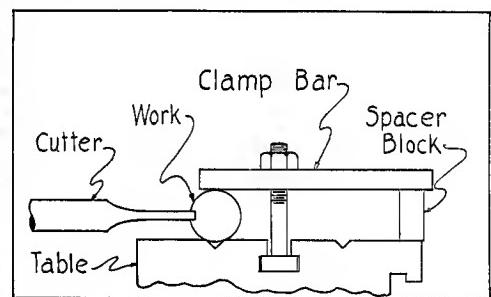


Fig. 17

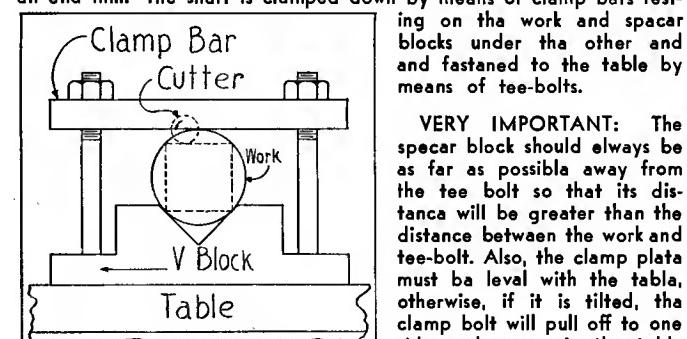


Fig. 18

Square stock may also be clamped in the V slots.

Another type of mounting for round stock is shown in Fig. 18. In this case a square is to be milled with an end mill on the end of the shaft. An auxiliary vee block is used and set at right angles to the table travel. Note that the tee bolts go through the vee block and placed equidistant from work so that each bolt takes an equal share of the pull. The vee block also acts as a pressure block against the table above the tee bolts which is a very important point to remember. Without disturbing the work, all four sides of the square are milled at one setting—first the bottom, side, top and finally the other side.



Fig. 19

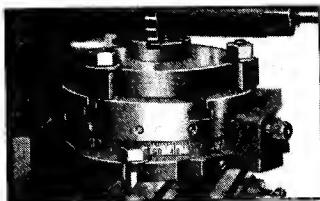


Fig. 20

Fig. 28 shows a set-up for cutting flutes in a piece of tapered work. The work is held between centers which in turn are clamped in the V of the table. The difference in diameters of the centers is equal to the difference in diameters of the two ends of the tapered stock.

A swivel vise, see figs. 9 and 19 will be found to be an indispensable attachment to hold work for most milling operations.

The following attachments are also available: Index Centers, used for splining, fluting, gear cutting and squaring shafts (see figs. 16 and 21); Rotary Index Table, for angular indexing and spacing (see fig. 20); and Angle Plate, which holds work which cannot be gripped in the vice or bolted to the table (see fig. 24).

When gripping work in a vise which is less in thickness than the depth of the vise jaws, place spacers underneath work to obtain sufficient clearance above jaws.

If any production work is to be done, it is advisable to make a special fixture or jig to hold the work.

MOUNTING THE CUTTERS

Slab mills, side mills and metal slitting saws are mounted on an arbor which is supported on both ends—one end in the spindle and the other in the arbor support bracket. The cutter is driven by means

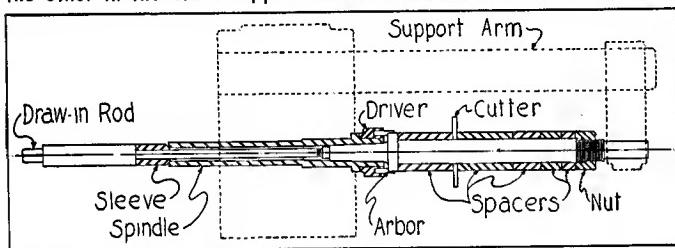


Fig. 22

frictional force of the spacers which are tightened up against it. See fig. 22. A key should be used on the larger cutters. The arbor driver is screwed on the spindle nose and the two prongs drive the cutter arbor. The cutter arbor has a tapered shank which fits into the spindle taper. Be sure these tapers are scrupulously clean before mounting cutter arbor. The arbor is locked into the spindle by means of a draw bar. After arbor is locked into position, place the arbor support bracket over the other end of the cutter arbor. Turn the spindle by hand so that the arbor bracket will adjust itself and clamp securely in place on the arbor support arm after arm is also locked into place.

To remove the cutter arbor, loosen and remove the arbor bracket and draw-in rod. With a BRASS rod, bump the arbor out of the spindle.

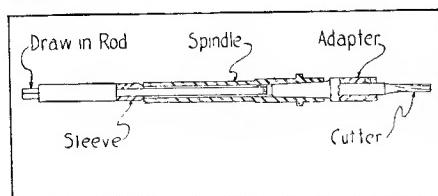


Fig. 23

In the case of a straddle milling set-up, a spacer of correct thickness has to be used between the two cutters. The nearest spacer or combination of spacers should be used with thin shim spacers in addition until the correct thickness between cutters is obtained. In some instances it might be advisable to turn out a spacer on a lathe to the correct size.

Dovetail cutters, end mills and keyway cutters are mounted in a shank cutter adapter. See fig. 23.

The arbor support unit is not used in this case.

End mills use bushings on cutters with shanks less than $\frac{1}{2}$ " diameter.

To remove the shank cutter adapter, loosen and remove the draw-in bar and with a BRASS rod, bump the adapter out of the spindle.

The spiral end mill is adapted to the spindle by a shell end mill driver. This driver has two driving pins which fit into recesses in the cutter and a ground pilot for cutter hole with a large retainer screw. Fig. 26 shows a spiral end mill.

FORMED CUTTERS

Occasionally a specific shape is wanted. In such cases a formed cutter will have to be used and is made specially to give the desired shaped cut. Only in the case of production set-ups is it advisable to warrant the expense of a formed cutter.

DEPTH OF CUT

The depth of cut will vary, of course, according to the amount of stock to be removed. THE MAXIMUM DEPTH OF CUT SHOULD NEVER EXCEED $\frac{1}{8}$ " ON THIS MILLER EXCEPT ON SLITTING OPERATIONS. The first cut on a rough casting should be deep enough to cut below the "surface scale" otherwise the cutter will quickly become dulled, because the "scale" is much harder than the rest of the casting.

FINISHING CUTS

When taking a finishing cut, drop the Change-O-Matic to the next lower "Feed per R.P.M." setting. This has the same effect as if the R.P.M. of the cutter were speeded up.

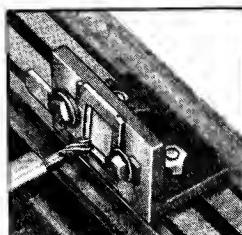


Fig. 24

CUTTING FLUIDS

Cutting fluids are used mainly for cooling purposes, that is, to carry the heat away from the cutter. Cutting fluids also have a slight lubricating quality and serve to flush away the chips from the cutter. The following materials do not require lubrication: ordinary gray cast iron, yellow brass castings and babbitt. Some kind of lubricant should be used when milling wrought iron, steel, steel castings, malleable-iron castings, bronze, copper and the various copper alloys.

The best lubricant is pure lard oil. A mixture of soluble oil and water will also make a good lubricant.

An automatic coolant system or a coolant tank (gravity feed) are available for your milling machine. Refer to catalog for full information.

UP-MILLING AND DOWN-MILLING

(Also Known as Climb Milling)

In the case of up-milling, the teeth of the cutter, when they come in contact with the work, rotate against the direction in which the work is traveling. In the down milling operation (climb milling), the opposite is the case, namely, the cutters rotate in the direction the work is traveling.



Fig. 25 — SLOTTING
MILLING MACHINE. THE MACHINE IS NOT INTENDED FOR THIS KIND OF MILLING AND IF USED THE CONSEQUENCES CAN ONLY BE BLAMED TO THE OPERATOR AND NOT TO THE MACHINE.



Fig. 26 — FACING

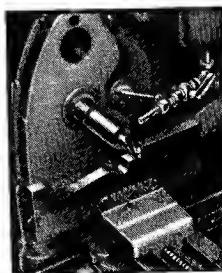


Fig. 27 — PROFILING

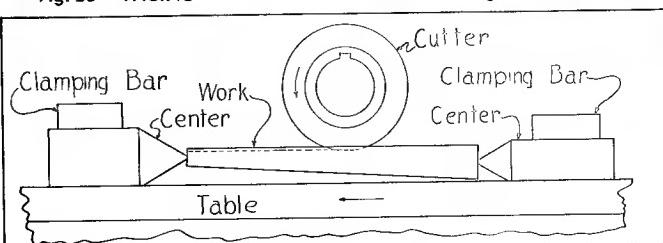


Fig. 28

INSTRUCTIONS FOR REPLACING THE SPINDLE BELT

See Fig. 29. First set the Change-O-Matic feed in the .003 position as shown at "A". This will enable the rotary change gear bracket inside gear case "C" to clear the frame of the milling machine when removing gear case.

Next remove the four cap screws marked "B". Gear case "C" can then be removed by pulling directly away from inner gear plate "D".

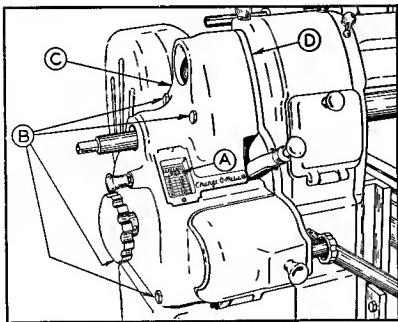


Fig. 29

See Fig. 30. Remove cap screw "E" and pull off the feed gear. With a thin end wrench unscrew stud "F." The complete tumbler gear assembly may then be removed from the machine.

Next remove four cap screws "G," inner gear plate "D" may then be pried off with the aid of a screw driver. Care should be taken not to damage or lose the two dowel pins "H." This may be accomplished by prying alternately on opposite sides of the plate.

See Fig. 5, page 2. Loosen set screw "B" and unscrew collar "C" by turning counter-clockwise. Care should be exercised not to lose the small cushion of soft material that is located under set screw "B". Gear "G" may now be removed by pulling directly away from the head.

Next pry out Woodruff key "E" and pull collar "H" off from the spindle. Loosen set screw in collar "D" and TWO set screws "F" in gear "I". With a lead hammer or a machinist's hammer and a black

Following applies to all Models (except Nos. 22, 23 and 24 which applies to Hand Lever Model only). Use a good grade of S.A.E. No. 10 motor oil or equivalent throughout unless otherwise specified.

1. **SPINDLE BEARINGS (left and right):** Oil every time the milling machine is used.
2. **BACK GEARS (not illustrated):** Every time back gears are used, remove small screw in center of back-gear spindle and oil freely. Replace screw. Occasionally, also apply oil to back-gear eccentrics.
3. **SPINDLE PULLEY BEARINGS (not illustrated):** Oil at regular intervals. To oil, remove set screw in large step of spindle pulley.
4. **ARBOR SUPPORT:** Oil every time cutter arbor is used in conjunction with support.
5. **VERTICAL KNEE WAYS:** Clean regularly and occasionally apply a liberal quantity of oil.
6. **CROSS SLIDE WAYS (for table):** Clean regularly and apply a liberal quantity of oil every time machine is used.
7. **CROSS SLIDE WAYS (on knee):** Clean regularly and apply a liberal quantity of oil every time machine is used.
8. **TABLE FEED SCREW BEARINGS:** Occasionally apply a few drops of oil.
9. **KICK-OUT TRIPPER SHAFT:** Occasionally apply a few drops of oil.
10. **KNEE LIFT SCREW SHAFT:** Occasionally apply a few drops of oil.
11. **FEED GEAR CASE BEARING:** Apply a few drops of oil every time machine is used.

of wood, carefully drive the spindle "A" in the direction shown by the arrow until Woodruff key "J" appears beyond the face of gear "I". The spindle then should be rotated until the Woodruff key enters the notch in the top of dust cover "M". After the key has entered the notch, proceed to drive out the spindle the rest of the way; dust cover "N" will be automatically removed with it. Care should be exercised not to lose the various loose parts such as the spindle pulley, spindle gear and adjustment collar when removing the spindle.

TO REMOVE BACK GEARS

Next, it is necessary to remove the back gears. Drive out pin "K" in the eccentric handle and loosen the two set screws "L". Back gear shaft "O" can be pushed out in the direction indicated by the arrow.

The old belt can now be pulled out of the machine and a new belt inserted.

TO REASSEMBLE

All parts should first be cleaned. Then put the back gear assembly together, reference to Figure 5 will assist in getting the parts in their proper places.

Next, assemble the spindle with its various parts and refer to page 2 for making the proper adjustments.

Both assemblies should then be thoroughly oiled and greased according to the lubrication chart.

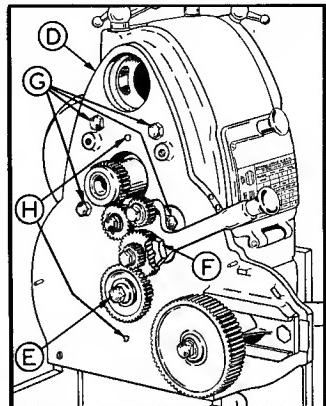
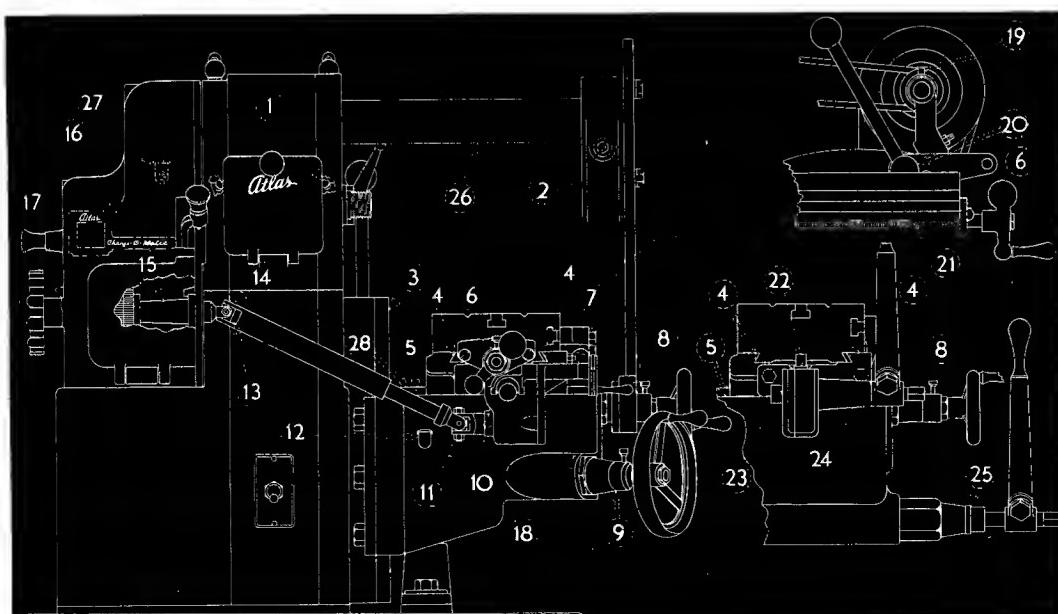


Fig. 30

LUBRICATION CHART

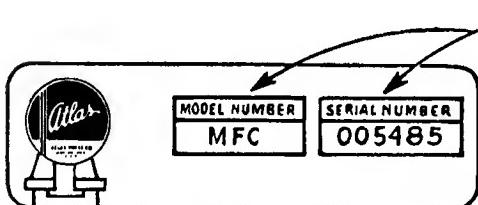
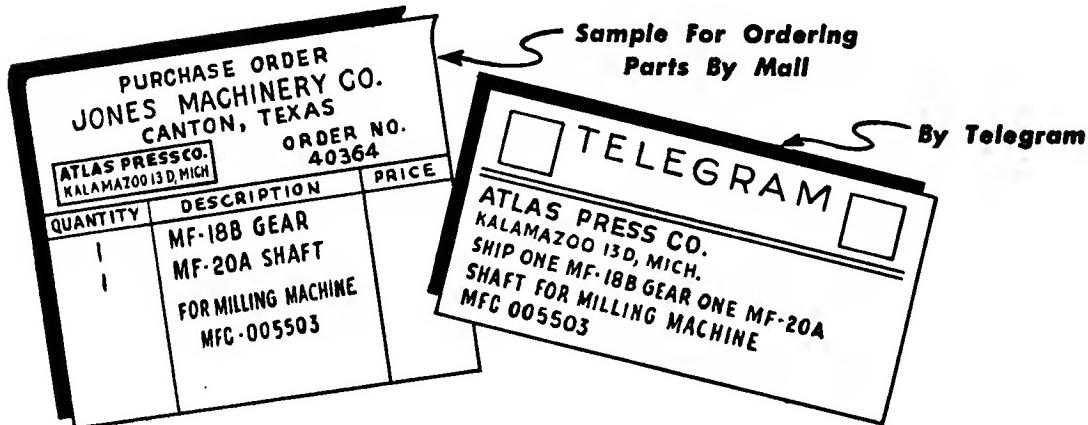
11. and 14. **UNIVERSAL DRIVE JOINTS:** Apply a few drops of oil every time machine is used.
12. **KNEE LIFT SCREW AND GEARS:** Oil every time the machine is used. About once a month clean the knee lift screw with kerosene and a small stiff brush, (raise table to its maximum height) and apply a small amount of oil.
13. **UNIVERSAL DRIVE SCOPE:** Frequently remove oil screw and apply a small amount of oil; then, replace screw.
14. See number 11.
15. **UNIVERSAL DRIVE SHAFT BRACKET:** Open side gear cover and apply a few drops of oil every time machine is used.
16. **GEARS:** A small amount of heavy graphite outer gear lubricant applied to gear teeth will aid in obtaining smoother, quieter operation. Be sure to remove all oil in the gear teeth before applying lubricant or it will not adhere. The best way to get at the gears is to remove gear guard (change-o-matic unit). A small amount of oil should also be applied to change gear bearings.
17. **CHANGE-O-MATIC KNOB BEARING:** Occasionally apply a few drops of oil. Especially to ball oiler.
18. **KNEE LIFT SHAFT BEARINGS:** Put a few drops of oil in the oil hole after removing the small screw. Replace screw.
19. **COUNTERSHAFT BEARINGS:** Oil these two bearings every time machine is used.
20. **ROCKERSHAFT BEARINGS:** Apply a few drops of oil occasionally to the rockershaft bearings.
21. **TABLE FEED SCREW:** About once a month clean the feed screw threads with kerosene and a small stiff brush and apply a small amount of oil along its entire length.
22. **TABLE FEED RACK:** About once a month apply a small amount of cup grease to the rack after cleaning with kerosene and a small stiff brush.
- 23 and 24. **RACK GEAR SHAFT BEARINGS:** Apply a few drops of oil every time machine is used.
25. **KNEE LIFT SHAFT BEARING:** Apply a few drops of oil every time machine is used.
26. **SUPPORT ARM:** Occasionally apply a little oil to the cutter support arm.
27. **TUMBLER GEARS:** Apply a few drops of oil every time machine is used
28. **CROSS FEED AND KNEE LIFT SCREWS:** Oil at regular intervals. To oil, move table to extreme front position and with a screw driver slide screw cover forward until screws are exposed.



ORDERING INFORMATION

IMPORTANT: The following information must be furnished on all repair part orders.

1. Quantity Required
2. PART NUMBER and Name of Part
3. Model and Serial Number of Milling Machine

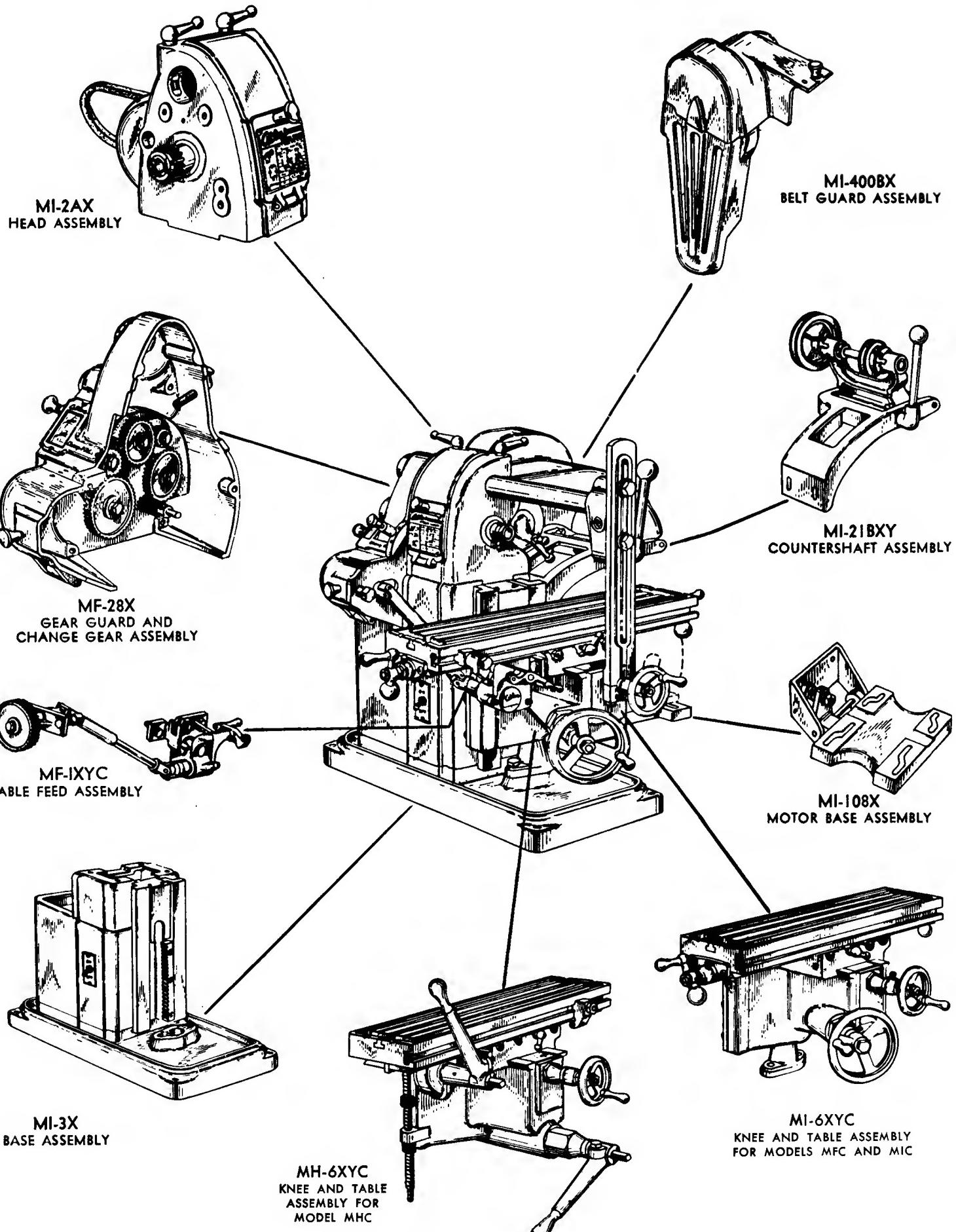


Parts shown without part numbers are standard parts and should be purchased locally.
We reserve the right to make changes in design and specifications without notice.

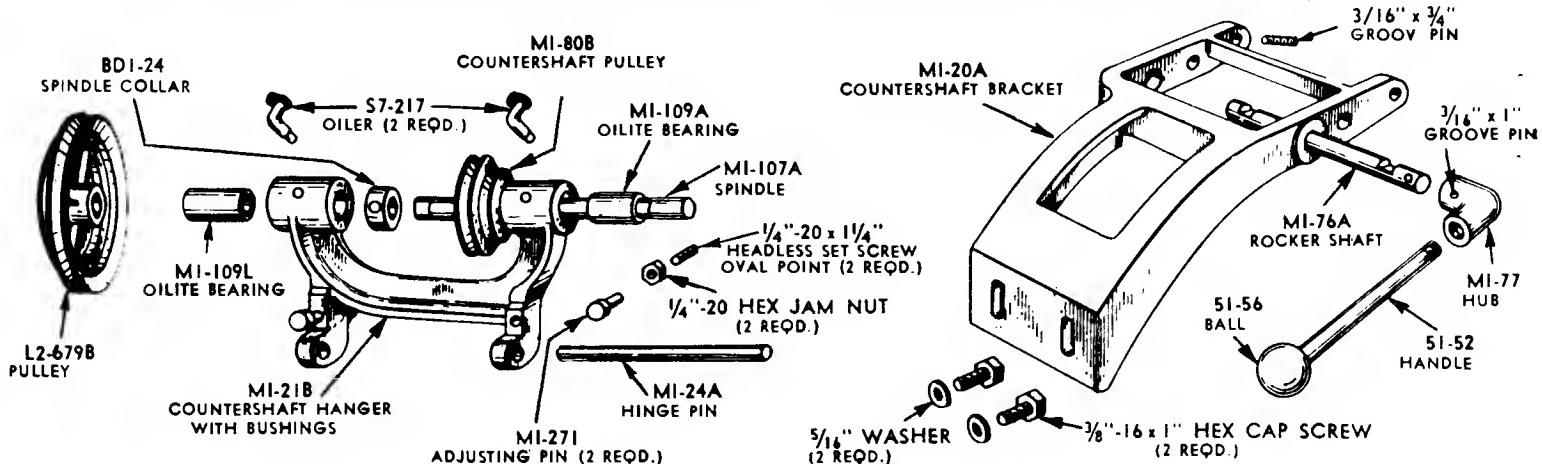
INDEX FOR MILLING MACHINE PARTS

Unit Assemblies	2
Base and Housing, Countershaft and Belt Guards	3
Motor Base, Belts and Pulleys	3
Head, Cutter Guard, Back Gear and Spindle Assemblies	4
Gear Guards and Change Gears	5
Tumbler Gears and Table Feed	6
Cross Slide, MFC and MIC Knee and Table	7
MHC Knee and Table	8
MIA, MIA-G, MFA, and MFA-G Parts List	9 & 10
MI, MI-G, MF, MF-G, MH, and MH-G Parts List	11 & 12
MFB, MIB, and MHB Parts List	13

**UNIT ASSEMBLIES FOR
MFC, MIC AND MHC MODEL MILLING MACHINES**



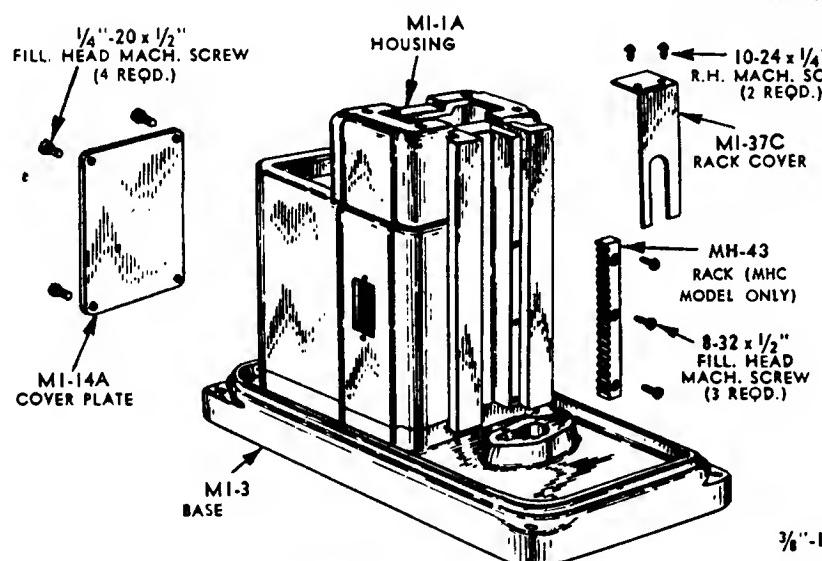
Parts on this page are for Model Nos. MFB, MIB, MHB -- and Nos. MFC, MIC and MHC. **IMPORTANT:** if part is circled -- and serial number of your machine is in this range -- 005466 to 008123 -- see page 13 for correct part number.



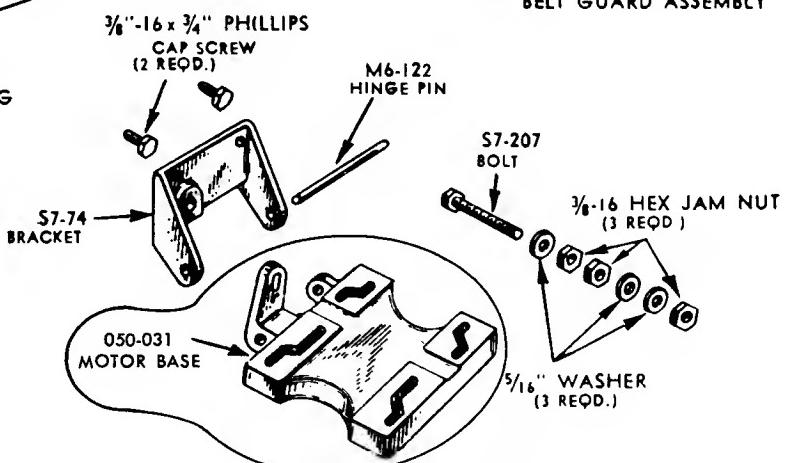
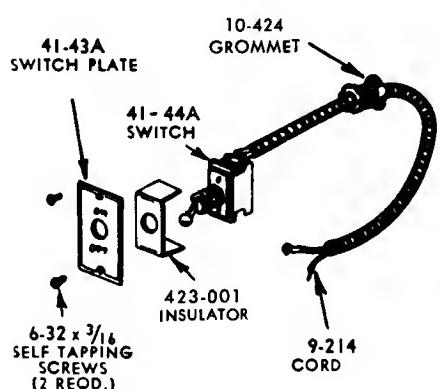
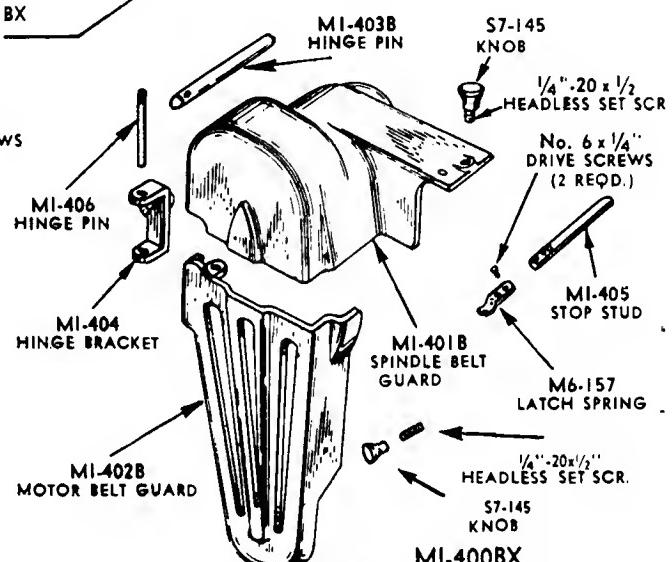
MI-21BX
COUNTERSHAFT HANGER
ASSEMBLY

MI-21BX
COUNTERSHAFT
ASSEMBLY
CONSISTS OF MI-21BX
AND MI-20AX
ASSEMBLIES

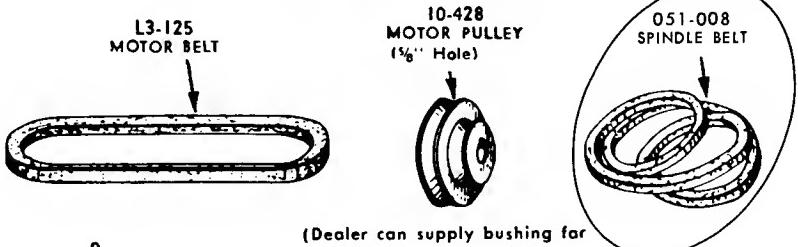
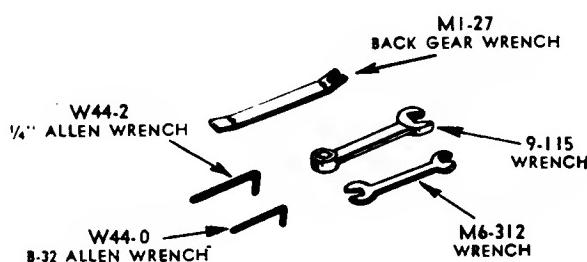
MI-20AX
COUNTERSHAFT BRACKET
ASSEMBLY



MI-3X
BASE AND HOUSING
ASSEMBLY

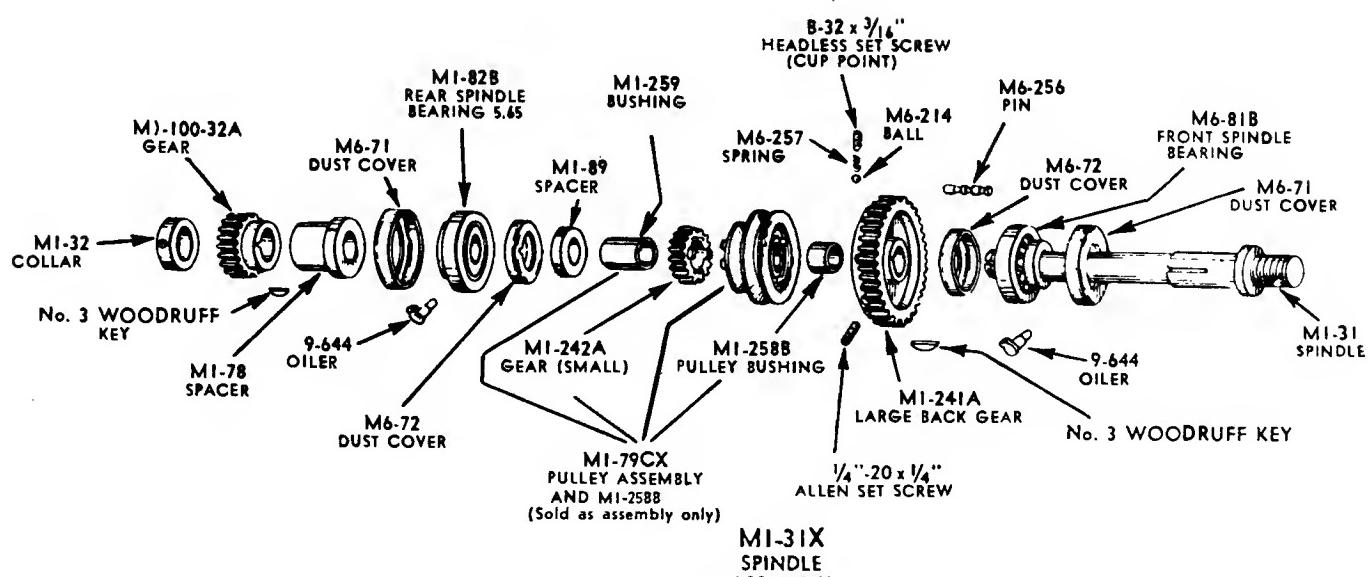
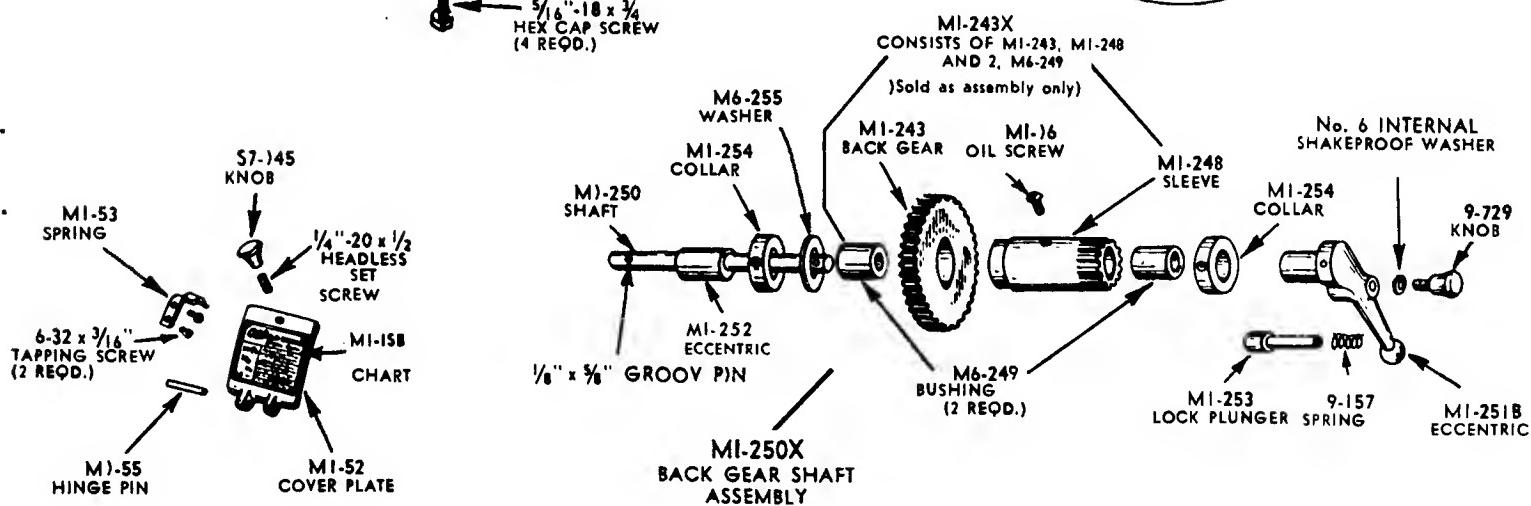
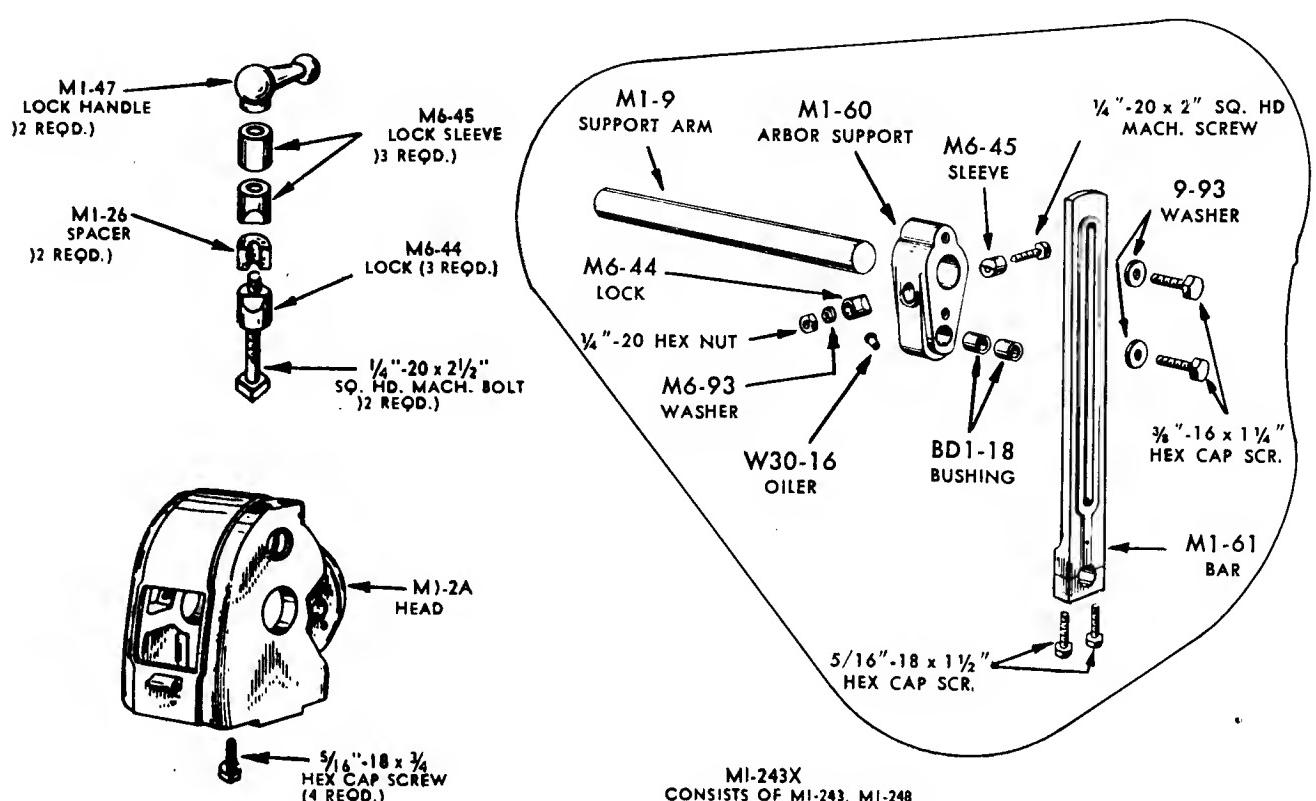


MI-108X
MOTOR BASE ASSEMBLY

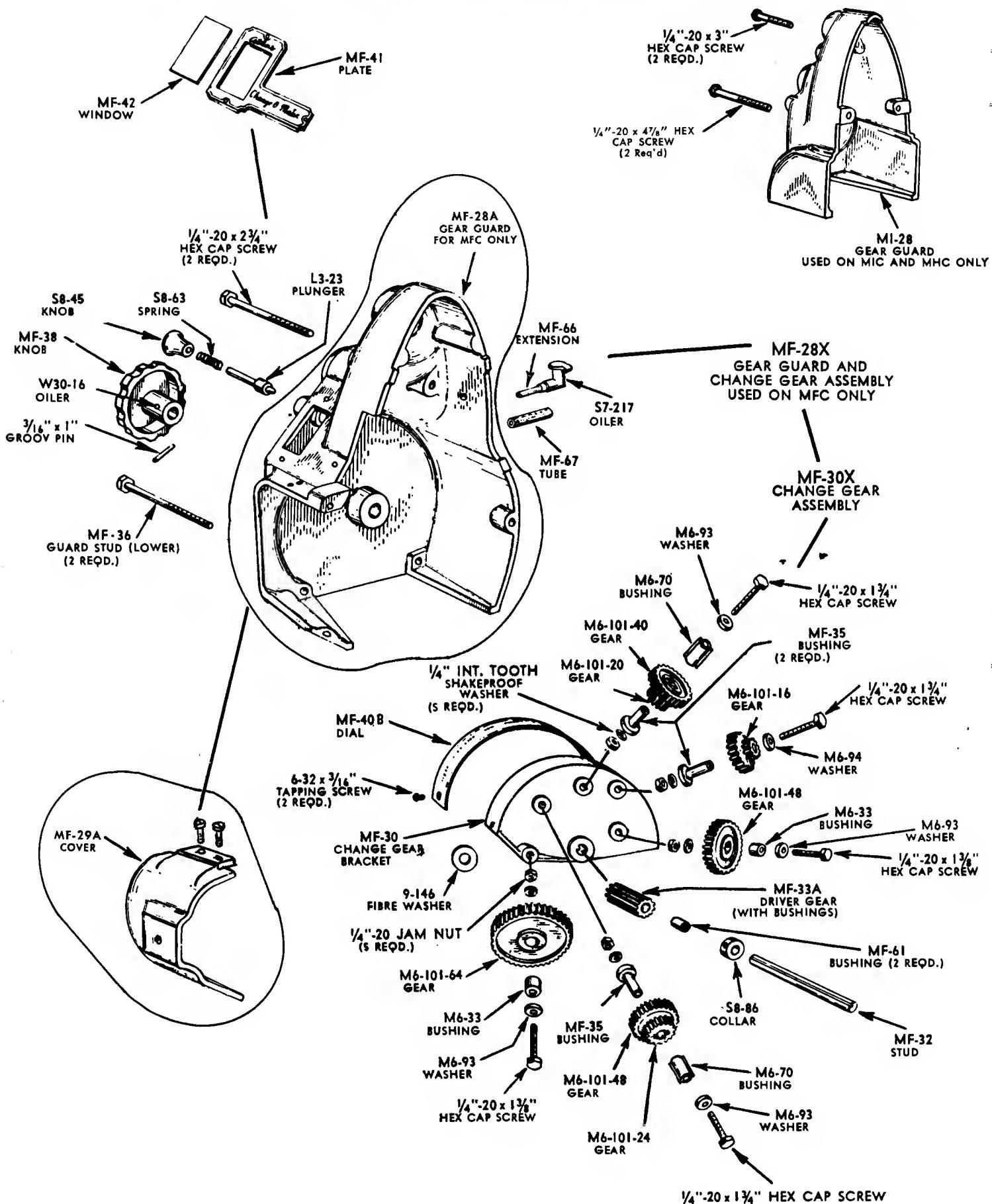


(Dealer can supply bushing for 1/2" dia. shaft motor.)

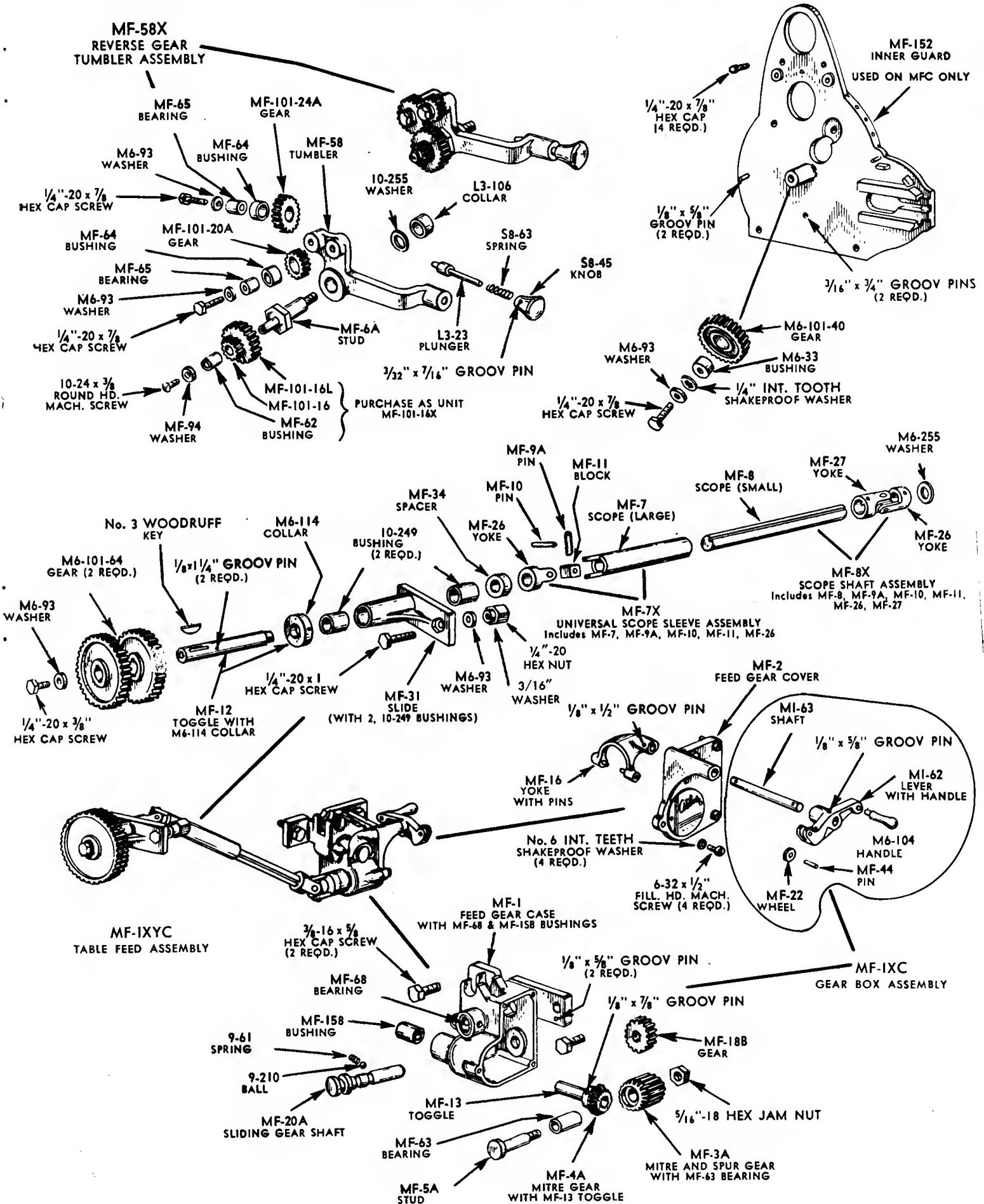
Parts on this page are for Model Nos. MFB, MIB, MHB -- and Nos. MFC, MIC and MHC. **IMPORTANT:** if part is circled -- and serial number of your machine is in this range -- 005466 to 008123 -- see page 13 for correct part number.



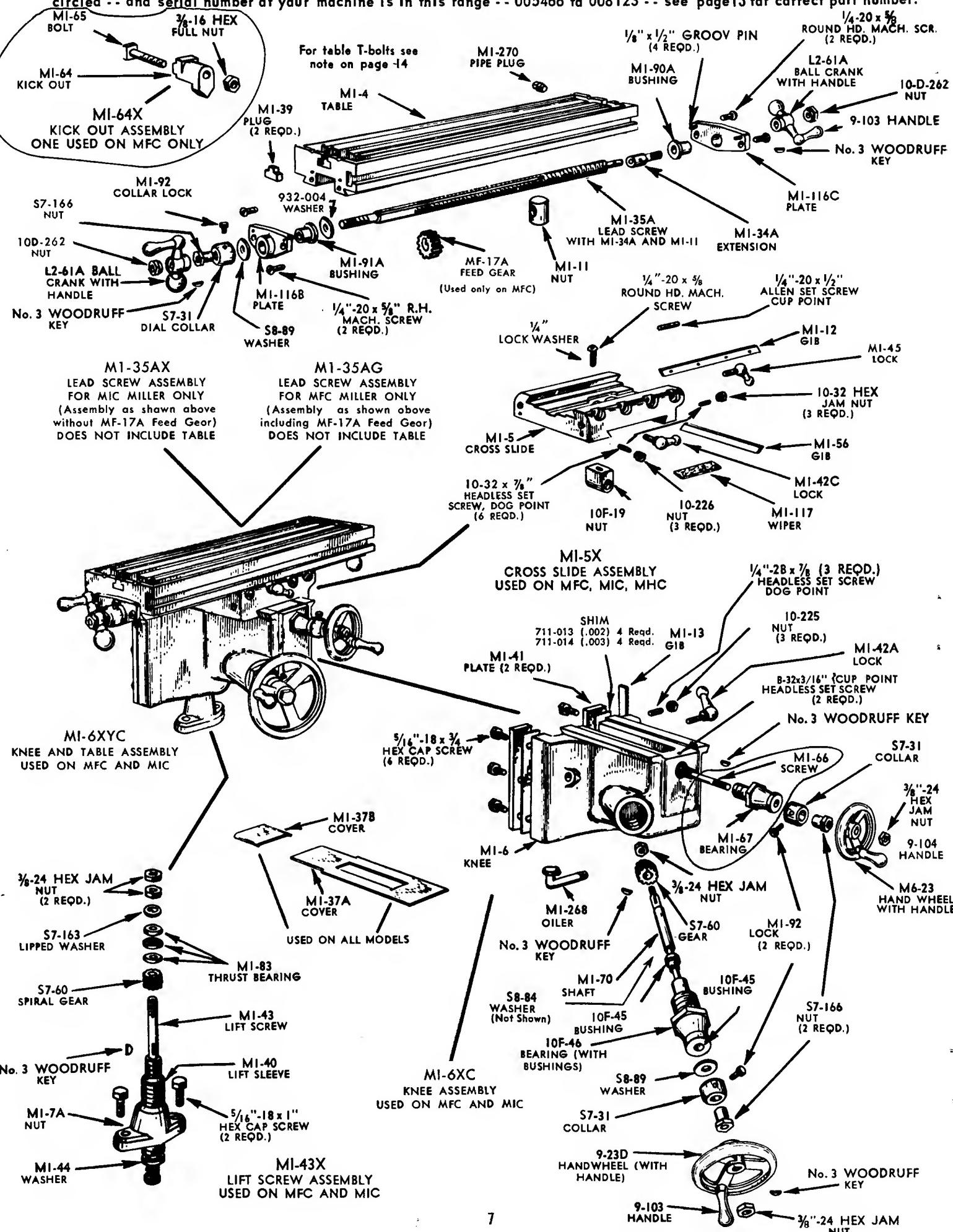
Parts on this page are for Model Nos. MFB, MIB, MHB -- and Nos. MFC, MIC and MHC. **IMPORTANT:** if part is circled -- and serial number of your machine is in this range -- 005466 to 008123 -- see page 13 for correct part number.



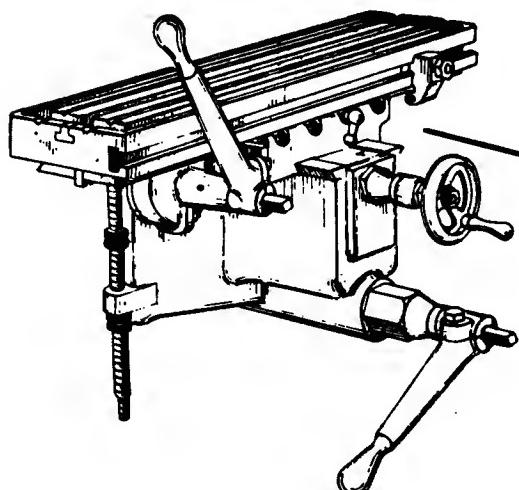
Parts on this page are for Model Nos. MFB, MIB, MHB -- and Nos. MFC, MIC and MHC. **IMPORTANT:** if part is circled -- and serial number of your machine is in this range -- 005466 to 008123 -- see page 13 for correct part number.



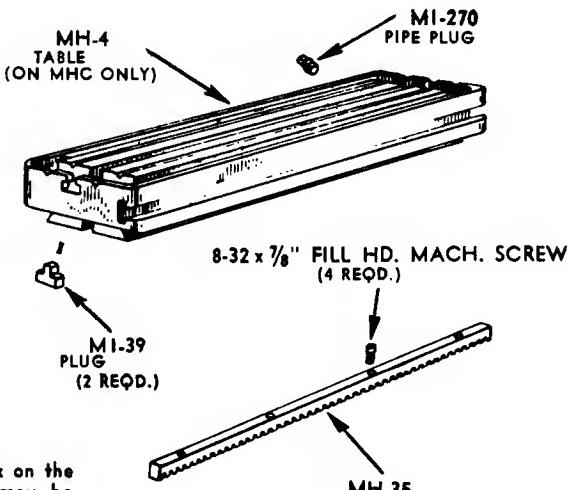
Parts on this page are for Model Nos. MFB, MIB, MHB -- and Nos. MFC, MIC and MHC. **IMPORTANT:** if part is circled -- and serial number of your machine is in this range -- 005466 to 008123 -- see page 13 for correct part number.



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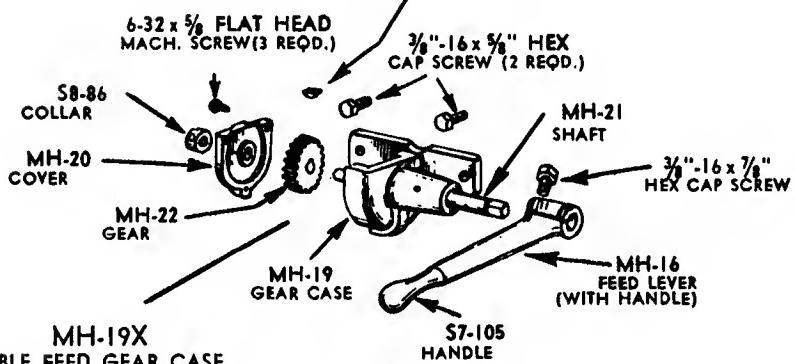


MH-6XYC
KNEE AND TABLE ASSEMBLY
USED ON MHC ONLY



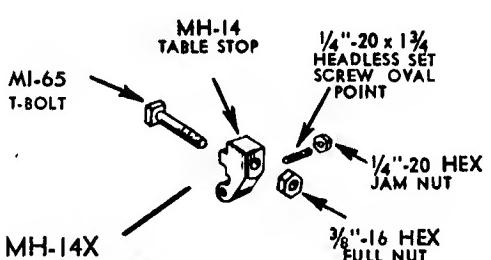
No. 3 WOODRUFF KEY

NOTE — T-bolts for holding work on the table of the Milling Machine may be made by procuring $\frac{3}{8}$ " Square Head Machine Bolts from your local hardware and reducing the thickness of the head to $\frac{7}{32}$ ".

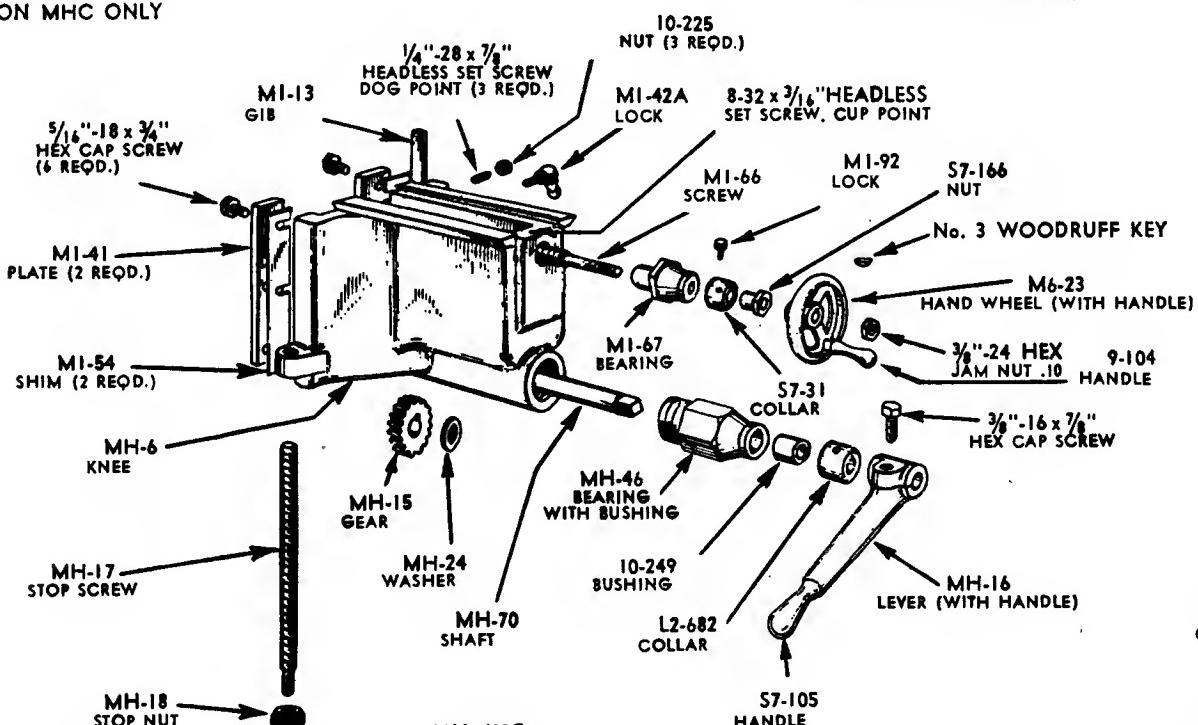


MH-19X
TABLE FEED GEAR CASE
ASSEMBLY
USED ON MHC ONLY

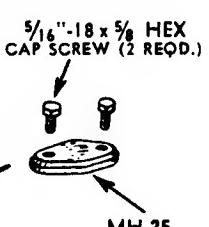
MH-4X
TABLE ASSEMBLY
FOR MHC ONLY



MH-14X
TABLE STOP ASSEMBLY
2 REQD. ON BOTH
MIC AND MHC MILLERS

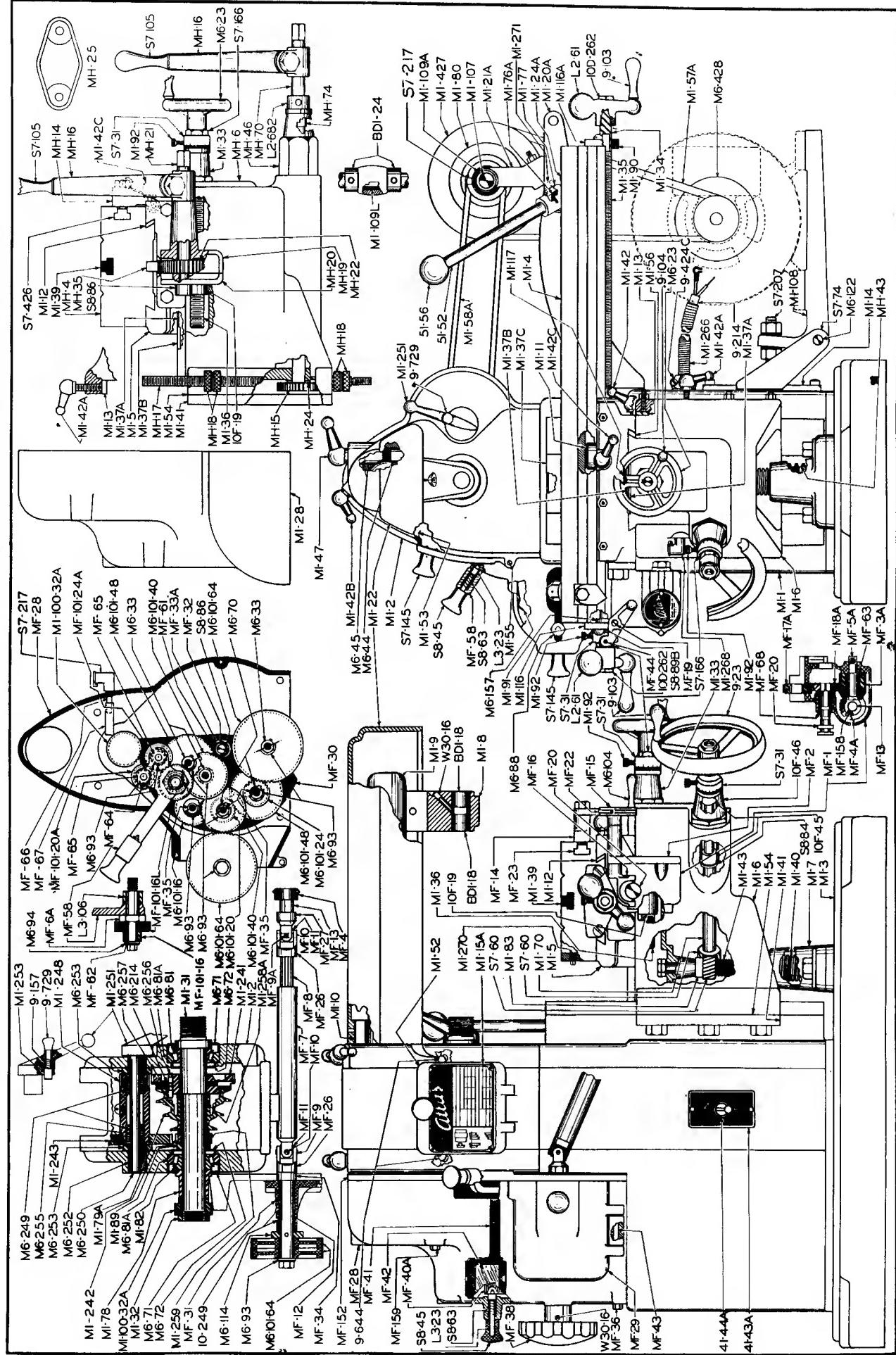


MH-6XC
KNEE ASSEMBLY
FOR MHC ONLY
(Includes MH-43 Rock)



Used on M1-3
Base in place of MI-7A
Lift Screw Nut on MHC
Miller only.

CATALOG NOS. MIA and MIA-G; MFA and MFA-G; MHA and MHA-G



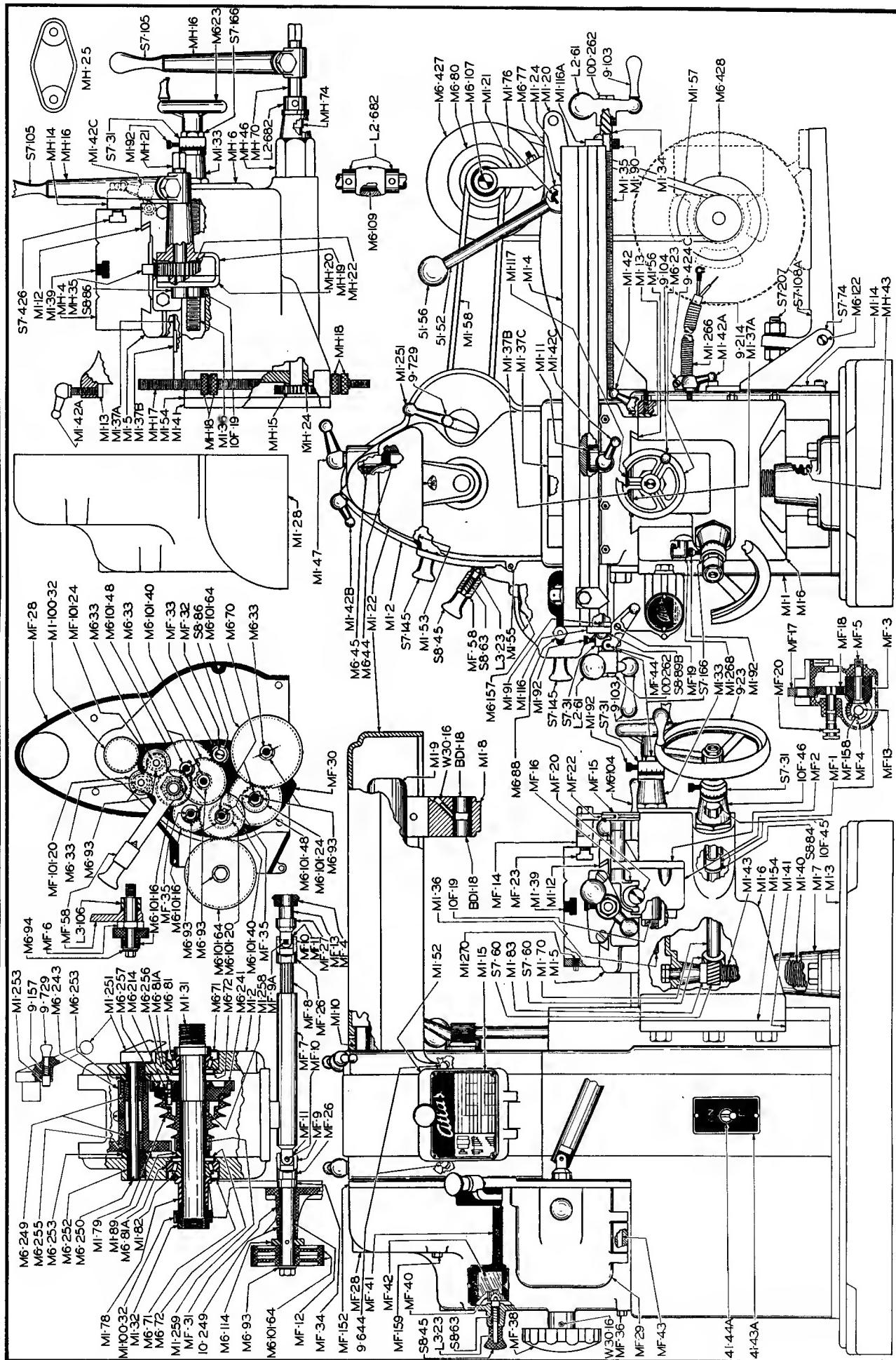
CATALOG NOS. MIA and MIA-G; MFA and MFA-G; MHA and MHA-G

Part No.	Name	Part No.	Name	Part No.	Name
	MIA STANDARD MODEL				
M1-1	Housing Head	M1-52	Side Cover Plate	M6-285	Back Gear Washer (Quantity as Req'd)
M1-2	Base	M1-53	Side Cover Plate Spring	M6-256	Beck Gear Lock Pin
M1-3	Table	M1-54	Knee Shim (2 Req'd)	M6-257	Beck Gear Plunger Spring
M1-4	Cross Slide	M1-55	Cover Hinge Pin	M1-288A	Spindle Pulley Bushing
M1-5	Knee	M1-56	Rocker Shaft Ball	M1-259	Bell Crank Nut (2 Req'd)
M1-6	Lift Screw Nut	M1-58	Cross Slide Gib	10D-262	Change Gear Knob
M1-7A	Arbor Support Arm	M1-57A	Motor Belt	M1-266	Change Gear (2 Req'd)
M1-8	Cutter Guard Pin	M1-58B	Spindle Belt	M1-268	Diel
M1-9	Table Screw Nut	S7-60	Spindle Gear (2 Req'd)	M1-270	Ecudcheon Plate
M1-10	Table Gib	L2-61A	Ball Crank—with Handle (2 Req'd)	M1-271	Window
M1-11	Knee Gib	9-61	Spring	M1-271	Guard Hinge Pin
M1-12	Cover Plate	M1-70	Knee Lift Gear Shaft	M1-44	Lever Wheel Pin
M1-13	Table Stop	M6-71	Dust Cover—Large (2 Req'd)	S9-45	Reverse Turner Knob (2 Req'd)
M1-14	Speed Chert	M6-72	Dust Cover—Small (2 Req'd)	M6-101-43	Change Gear (2 Req'd)
M1-15A	Oiler (used in M1-8 and MF-38)	S7-74	Motor Base Bracket	MF-5B	Reverse Gear Tumbler
W30-16	Arbor Support Bushings (2 Req'd)	M1-76A	Rocker Shaft Hub	MF-61	Driver Gear Bearing (2 Req'd)
BDI-18	Cross Slide Nut	M1-77	Spindle Bearing Spacer	MF-62	Compound Gear Bearing
10F-19	Counterhaft Bracket	M1-78	Spindle Pulley	MF-63	Bavel and Spur Gear Bearing
M1-20A	Counterhaft Hanger	M1-79B	Counterhaft Pulley (3 step)	S8-63	Plunger Spring (2 Req'd)
M1-21A	Cutter Guard (With Pin M1-10)	M6-80B	Spindle Bearing Cone end Cup (Front)	MF-64	Tumbler Gear Bearing (2 Req'd)
M1-22	Handwheel (Large) with Handle	M1-81B	Spindle Bearing Cone end Cup (Rear)	M6-101-64	Change Gear (3 Req'd)
9-23	Handwheel (Small) with Handle	M1-82B	Spindle Bearing Cone Thrust Bearing	MF-65	Tumbler Gear Bushing (2 Req'd)
M6-23	Counterhaft Hinge Pin	S8-84	Knee Lift Screw Thrust Bearing	MF-66	Oiler Extension
M1-24A	Arbor Support Arm Lock Spcer—	M1-88	Spindle Gear Spacer	MF-67	Oiler Tube
M1-26	Not illus. (2 Req'd)	S8-89B	Washer (For Table Lead Screw)	MF-68	Feed Gear Case
M1-27	Back-Gear Wrench (Not Illus.)	M1-90	Feed Screw Bushing — Right	M6-70	Compound Gear Bushing (2 Req'd)
M1-28	Gear Guard (Standard end)	M1-91	Feed Screw Bushing — Left	S8-86	Driver Gear Stud Collar
Hand Feed Models	Graduated Collar Lock (3 Req'd)	M1-92	Graduated Collar Lock (3 Req'd)	M6-93	Change Gear Wesher (9 Req'd)
M1-31	Spindle	9-103	Handle (3 Req'd)	M6-94	Change Gear Wesher
M1-100-32A	Spindle Adjusting Collar	9-104	Cross Feed Wheel Handle	M1-106	Collar
M1-33	Cross Slide Screw	M1-107	Counterhaft Spindle	MF-114	Drive Toggle Collar
M1-34	Bearing	M1-108	Motor Base	MF-152	Geer Guard (Inner)
M1-35	Lead Screw Extension (Buy with M1-35)	M1-109L	Counterhaft Oilitte Bearing	S7-217	Gits "L" Oiler
M1-36	Table Lead Screw (With Extension M1-34)	9-115	Combination Wrench (Not Illus.)	M6-157	Latch Spring
MF-36	Cross Slide Screw	M1-116A	Table Thrust Plate	MF-5A	Universal Scope Sleeve Assembly
M1-37A	Gear Guard Stud (2 Req'd)	M1-117	Cross Slide Wiper	MF-10	Universal Scope Shaft Assembly
M1-37C	Cross Feed Screw Cover (Front)	M6-122	Hinge Pin	MF-11	Universal Scope Gear Stud
M1-39	Lift Rack Cover	S7-145	Knob	MF-26	Universal Drive Toggle
M1-40	Table T-Slot Plug (2 Req'd)	9-157	Spring	MF-27	Universal Gear Case Toggle
M1-41	Lift Sleeve	S7-163	Lipped Washer (Not Illus.—used on M1-43)	MF-17A	All Parts the same as for the M1 Standard Model,
M1-42	Knee Bearing Plate (2 Req'd)	S7-166	Thrust Nut (3 Req'd)	10F-101-16L	except for following:
M1-42A	Gib Lock (Cross Slides)	S7-207	Motor Base Bolt	MF-17A	All Parts the same as for the M1 Standard Model,
M1-42B	Knee Gib Lock	9-210	3/16" Steel Ball	MF-18	except for following:
M1-42C	Cutter Guard Lock	9-214	Switch Cord	MH-17	All Parts the same as for the M1 Standard Model,
41-43A	Table Gib Lock	M6-214	1/8" Steel Ball	MH-18	except for following:
41-43	Switch Plate	S7-217	Gits "L" Oiler	MH-19	All Parts the same as for the M1 Standard Model,
M1-43	Knee Lift Screw	9-236A	Switch Insulator	MH-20	except for following:
41-44A	Knee Lift Rack	M1-241	Spindle Back Gear — Large	MH-21	All Parts the same as for the M1 Standard Model,
41-44	Switch	M1-242	Spindle Gear (small)	MH-22	except for following:
M1-44	Lift Screw Stop Washer	M1-243A	Beck Gear — with Bushings	MH-23	All Parts the same as for the M1 Standard Model,
M6-44	Arbor Support Arm Lock (2 Req'd)	10-249	Arbor Support Bearing (2 Req'd)	MH-24	except for following:
M6-45	Arbor Support Arm Lock Sleeve (4 Req'd)	M6-249	Beck Gear Bushing (2 Req'd)	MH-25	All Parts the same as for the M1 Standard Model,
10F-46	Lift Shaft Bearing—with Bushing	M1-250	Beck Gear Shaft	MH-26	except for following:
M1-47	Arbor Support Lock Handle (2 Req'd)	M6-252	Beck Gear Eccentric — Right	MH-27	All Parts the same as for the M1 Standard Model,
M1-52	Rocker Shaft Handle	M6-253	Beck Gear Eccentric — Left	MH-28	except for following:
M6-33	Back Gear Lock Plunger	M1-253	Beck Gear Set Collar (2 Req'd)	MH-29	All Parts the same as for the M1 Standard Model,
				MH-30	except for following:
				MH-31	All Parts the same as for the M1 Standard Model,
				MH-32	except for following:
				MH-33	All Parts the same as for the M1 Standard Model,
				MH-34	except for following:
				MH-35	All Parts the same as for the M1 Standard Model,
				MH-36	except for following:
				MH-37	All Parts the same as for the M1 Standard Model,
				MH-38	except for following:
				MH-39	All Parts the same as for the M1 Standard Model,
				MH-40	except for following:
				MH-41	All Parts the same as for the M1 Standard Model,
				MH-42	except for following:
				MH-43	All Parts the same as for the M1 Standard Model,
				MH-44	except for following:
				MH-45	All Parts the same as for the M1 Standard Model,
				MH-46	except for following:
				MH-47	All Parts the same as for the M1 Standard Model,
				MH-48	except for following:
				MH-49	All Parts the same as for the M1 Standard Model,
				MH-50	except for following:
				MH-51	All Parts the same as for the M1 Standard Model,
				MH-52	except for following:
				MH-53	All Parts the same as for the M1 Standard Model,
				MH-54	except for following:
				MH-55	All Parts the same as for the M1 Standard Model,
				MH-56	except for following:
				MH-57	All Parts the same as for the M1 Standard Model,
				MH-58	except for following:
				MH-59	All Parts the same as for the M1 Standard Model,
				MH-60	except for following:
				MH-61	All Parts the same as for the M1 Standard Model,
				MH-62	except for following:
				MH-63	All Parts the same as for the M1 Standard Model,
				MH-64	except for following:
				MH-65	All Parts the same as for the M1 Standard Model,
				MH-66	except for following:
				MH-67	All Parts the same as for the M1 Standard Model,
				MH-68	except for following:
				MH-69	All Parts the same as for the M1 Standard Model,
				MH-70	except for following:
				MH-71	All Parts the same as for the M1 Standard Model,
				MH-72	except for following:
				MH-73	All Parts the same as for the M1 Standard Model,
				MH-74	except for following:
				MH-75	All Parts the same as for the M1 Standard Model,
				MH-76	except for following:
				MH-77	All Parts the same as for the M1 Standard Model,
				MH-78	except for following:
				MH-79	All Parts the same as for the M1 Standard Model,
				MH-80	except for following:
				MH-81	All Parts the same as for the M1 Standard Model,
				MH-82	except for following:
				MH-83	All Parts the same as for the M1 Standard Model,
				MH-84	except for following:
				MH-85	All Parts the same as for the M1 Standard Model,
				MH-86	except for following:
				MH-87	All Parts the same as for the M1 Standard Model,
				MH-88	except for following:
				MH-89	All Parts the same as for the M1 Standard Model,
				MH-90	except for following:
				MH-91	All Parts the same as for the M1 Standard Model,
				MH-92	except for following:
				MH-93	All Parts the same as for the M1 Standard Model,
				MH-94	except for following:
				MH-95	All Parts the same as for the M1 Standard Model,
				MH-96	except for following:
				MH-97	All Parts the same as for the M1 Standard Model,
				MH-98	except for following:
				MH-99	All Parts the same as for the M1 Standard Model,
				MH-100	except for following:
				MH-101	All Parts the same as for the M1 Standard Model,
				MH-102	except for following:
				MH-103	All Parts the same as for the M1 Standard Model,
				MH-104	except for following:
				MH-105	All Parts the same as for the M1 Standard Model,
				MH-106	except for following:
				MH-107	All Parts the same as for the M1 Standard Model,
				MH-108	except for following:
				MH-109	All Parts the same as for the M1 Standard Model,
				MH-110	except for following:
				MH-111	All Parts the same as for the M1 Standard Model,
				MH-112	except for following:
				MH-113	All Parts the same as for the M1 Standard Model,
				MH-114	except for following:
				MH-115	All Parts the same as for the M1 Standard Model,
				MH-116	except for following:
				MH-117	All Parts the same as for the M1 Standard Model,
				MH-118	except for following:
				MH-119	All Parts the same as for the M1 Standard Model,
				MH-120	except for following:
				MH-121	All Parts the same as for the M1 Standard Model,
				MH-122	except for following:
				MH-123	All Parts the same as for the M1 Standard Model,
				MH-124	except for following:
				MH-125	All Parts the same as for the M1 Standard Model,
				MH-126	except for following:
				MH-127	All Parts the same as for the M1 Standard Model,
				MH-128	except for following:
				MH-129	All Parts the same as for the M1 Standard Model,
				MH-130	except for following:
				MH-131	All Parts the same as for the M1 Standard Model,
				MH-132	except for following:
				MH-133	All Parts the same as for the M1 Standard Model,
				MH-134	except for following:
				MH-135	All Parts the same as for the M1 Standard Model,
				MH-136	except for following:
				MH-137	All Parts the same as for the M1 Standard Model,
				MH-138	except for following:
				MH-139	All Parts the same as for the M1 Standard Model,
				MH-140	except for following:
				MH-141	All Parts the same as for the M1 Standard Model,
				MH-142	except for following:
				MH-143	All Parts the same as for the M1 Standard Model,
				MH-144	except for following:
				MH-145	All Parts the same as for the M1 Standard Model,
				MH-146	except for following:
				MH-147	All Parts the same as for the M1 Standard Model,
				MH-148	except for following:
				MH-149	All Parts the same as for the M1 Standard Model,
				MH-150	except for following:
				MH-151	All Parts the same as for the M1 Standard Model,
				MH-152	except for following:
				MH-153	All Parts the same as for the M1 Standard Model,
				MH-154	except for following:
				MH-155	All Parts the same as for the M1 Standard Model,
				MH-156	except for following:
				MH-157	All Parts the same as for the M1 Standard Model,
				MH-158	except for following:
				MH-159	All Parts the same as for the M1 Standard Model,
				MH-160	except for following:
				MH-161	All Parts the same as for the M1 Standard Model,
				MH-162	except for following:
				MH-163	All Parts the same as for the M1 Standard Model,
				MH-164	except for following:
				MH-165	All Parts the same as for the M1 Standard Model,
				MH-166	except for following:
				MH-167	All Parts the same as for the M1 Standard Model,
				MH-168	except for following:
				MH-169	All Parts the same as for the M1 Standard Model,
				MH-170	except for following:
				MH-171	All Parts the same as for the M1 Standard Model,
				MH-172	except for following:
				MH-173	All Parts the same as for the M1 Standard Model,
				MH-174	except for following:
				MH-175	All Parts the same as for the M1 Standard Model,
				MH-176	except for following:
				MH-177	All Parts the same as for the M1 Standard Model,
				MH-178	except for following:
				MH-179	All Parts the same as for the M1 Standard Model,
				MH-180	except for following:
				MH-181	All Parts the same as for the M1 Standard Model,
				MH-182	except for following:
				MH-183	All Parts the same as for the M1 Standard Model,
				MH-184	except for following:
				MH-185	All Parts the same as for the M1 Standard Model,
				MH-186	except for following:
				MH-187	All Parts the same as for the M1 Standard Model,
				MH-188	except for following:
				MH-189	All Parts the same as for the M1 Standard Model,
				MH-190	except for following:
				MH-191	All Parts the same as for the M1 Standard Model,
				MH-192	except for following:
				MH-193	All Parts the same as for the M1 Standard Model,
				MH-194	except for following:
				MH-195	All Parts the same as for the M1 Standard Model,
				MH-196	except for following:
				MH-197	All Parts the same as for the M1 Standard Model,
				MH-198	except for following:
				MH-199	All Parts the same as for the M1 Standard Model,
				MH-200	except for following:
				MH-201	All Parts the same as for the M1 Standard Model,
				MH-202	except for following:
				MH-203	All Parts the same as for the M1 Standard Model,
				MH-204	except for following:
				MH-205	All Parts the same as for the M1 Standard Model,
				MH-206	except for following:
				MH-207	All Parts the same as for the M1 Standard Model,
				MH-208	except for following:
				MH-209</	

Parts for milling machines serial number
00200 to 00134

00200 to 001344

CATALOG NOS. MI and MI-G; MF and MF-G; MH and MH-G



CATALOG NOS. M1 and M1-G; MF and MF-G; MH and MH-G

Part No.	Name	Part No.	Name
MI STANDARD MODEL			
M1-1	Housing	M1-258	Change Gear Slide with Bushings
M1-1-2	Head	M1-259	16 Tooth Driver Gear Stud
M1-1-3	Base	M6-32	Tumbler Gear Bushing (5 Req'd)
M1-1-4	Table	M6-33	Driver Gear
M1-1-5	Cross Slide	M1-266	Drive Toggle Spacer
M1-1-6	Knee	M1-268	Change Gear Stud Sleeve (3 Req'd)
M1-1-7	Lift Screw Nut	M1-270	Gear Guard Stud (2 Req'd)
M1-1-8	Arbor Support	M6-312	Change Gear Knob
M1-1-9	Arbor Support Arm	9-424C	T. & B Connector
M1-1-10	Cutter Guard Pin	M6-318	Double End Wrench (Not Illus.)
M1-1-11	Table Screw Nut	M6-427	Countershaft Pulley — 2 Step
M1-1-12	Table Gib	M6-428	Motor Pulley
M1-1-13	Knee Gib	M6-429	Oiler (2 Req'd)
M1-1-14	Cover Plate	M6-430	Countershaft Spindle Collar (2 Req'd)
M1-1-15	Table Stop	M6-431	Knob
M1-1-16	Speed Chart	M6-432	Allen Wrench (Not Illus.)
M1-1-17	Oiler (Used in MI-8 and MF-38)	M6-433	No. 8-32 Allen Wrench (Not Illus.)
M1-1-18	Cross Slide Nut	M6-440	Wrench (2 Req'd)
M1-1-19	Countershaft Bracket	M6-441	Reverse Tumbler Knob
M1-1-20	Countershaft Hanger	M6-442	Window
M1-1-21	Cutter Guard (With Pin M1-10)	M6-443	Guard Hinge Pin
M1-1-22	Handwheel (Large) with Handle	M6-444	Lever Wheel Pin
M1-1-23	Handwheel (Small) with Handle	M6-445	Reverse Tumbler
M1-1-24	Countershaft Hinge Pin	M6-446	Plunger Spring (2 Req'd)
M1-1-25	Arbor Support Arm Lock Spacers —	M6-447	Compound Gear Bushing (2 Req'd)
M1-1-26	Not Illus. (2 Req'd)	M6-448	Driver Gear Stud Collar
M1-1-27	Back-Gear Wrench (Not Illus.)	M6-449	Change Gear Washer (9 Req'd)
M1-1-28	Gear Guard (Standard and Hand Feed Models)	M6-450	Collar
M1-1-31	Spindle	M6-451	Drive Toggle Collar
M1-1-32	Graduated Dial Collar (3 Req'd)	M6-452	Gear Guard (Inner)
M1-1-33	Spindle Adjusting Collar	M6-453	Latch Spring
M1-1-34	Spindle Gear	M6-454	Bushing (In MF-1)
M1-1-35	Cross Slide Screw Bearing Extension (Buy with MI-34)	M6-455	Bushing (In MF-31) (2 Req'd)
M1-1-36	Lead Screw	M6-456	All Parts the same as for the MI Standard Model, except for following:
M1-1-37	Table Lead Screw (With Extension MI-34)	M6-457	All Parts the same as for the MI Standard Model, except for following:
M1-1-38	Cross Slide Screw	M6-458	All Parts the same as for the MI Standard Model, except for following:
M1-1-39	Gear Guard Stud (2 Req'd)	M6-459	To be purchased
M1-1-40	Cross Feed Screw Cover (Front)	M6-460	Toggle Block Pin (Large) with MF-7, MF-8,
M1-1-41	Cross Feed Screw Cover (Back)	M6-461	MF-11, MF-26 end
M1-1-42	Lift Rack Cover	M6-462	MF-27 as an assembly.
M1-1-43	Table T-Slot Plug (2 Req'd)	M6-463	All Parts the same as for the MI Standard Model, except for following:
M1-1-44	Knee Lift Sleeve	M6-464	Table
M1-1-45	Knee Bearing Plate (2 Req'd)	M6-465	Knee
M1-1-46	Gib Lock (Cross Slide)	M6-466	Lever
M1-1-47	Knee Gib Lock	M6-467	Feed
M1-1-48	Cutter Guard Lock	M6-468	Block
M1-1-49	Table Gib Lock	M6-469	Slide
M1-1-50	Switch Plate	M6-470	Gear
M1-1-51	Knee Lift Screw	M6-471	Toggle
M1-1-52	Knee Lift Rack	M6-472	Universal Gear Case Toggle
M1-1-53	Side Cover Plate	M6-473	Universal Gear Case
M1-1-54	Side Cover Plate Spring	M6-474	Kick Out
M1-1-55	Knee Shim (2 Req'd)	M6-475	Universal Gear Case
M1-1-56	Cover Hinge Pin	M6-476	Universal Gear Case
M1-1-57	Rocker Shaft Bell	M6-477	Universal Gear Case
M1-1-58	Cross Slide Gib	M6-478	Universal Gear Case
M1-1-59	Motor Belt	M6-479	Universal Gear Case
M1-1-60	Spindle Belt	M6-480	Universal Gear Case
M1-1-61	Spiral Gear (2 Req'd)	M6-481	Universal Gear Case
M1-1-62	Ball Crank—with Handle (2 Req'd)	M6-482	Universal Gear Case
M1-1-63	Spring	M6-483	Universal Gear Case
M1-1-64	Knee Lift Gear Shaft	M6-484	Universal Gear Case
M1-1-65	Dust Cover—Large (2 Req'd)	M6-485	Universal Gear Case
M1-1-66	Dust Cover—Small (2 Req'd)	M6-486	Universal Gear Case
M1-1-67	Motor Base Bracket	M6-487	Universal Gear Case
M1-1-68	Rocker Shaft Hub	M6-488	Universal Gear Case
M1-1-69	Spindle Bearing Spacer	M6-489	Universal Gear Case
M1-1-70	Spindle Pulley and Back Gear Countershaft Pulley (4 step)	M6-490	Universal Gear Case
M1-1-71	Spindle Bearing Cone and Cup (Front)	M6-491	Universal Gear Case
M1-1-72	Spindle Bearing Cone and Cup (Rear)	M6-492	Universal Gear Case
M1-1-73	Knee Lift Screw Thrust Bearing	M6-493	Universal Gear Case
M1-1-74	Washer (on M1-70)	M6-494	Universal Gear Case
M1-1-75	Spindle Gear Spacer	M6-495	Universal Gear Case
M1-1-76	Washer (For Table Lead Screw)	M6-496	Universal Gear Case
M1-1-77	Feed Screw Bushing — Right	M6-497	Universal Gear Case
M1-1-78	Feed Screw Bushing — Left	M6-498	Universal Gear Case
M1-1-79	Graduated Collar Lock (3 Req'd)	M6-499	Universal Gear Case
M1-1-80	Handle (3 Req'd)	M6-500	Universal Gear Case
M1-1-81	Cross Feed Wheel Handle	M6-501	Universal Gear Case
M1-1-82	Countershaft Spindle	M6-502	Universal Gear Case
M1-1-83	Motor Base	M6-503	Universal Gear Case
M1-1-84	Countershaft Oilite Bearing (2 Req'd)	M6-504	Universal Gear Case
M1-1-85	Combination Wrench (Not Illus.)	M6-505	Universal Gear Case
M1-1-86	Table Thrust Plate	M6-506	Universal Gear Case
M1-1-87	Table Thrust Plate	M6-507	Universal Gear Case
M1-1-88	Cross Side Wiper	M6-508	Universal Gear Case
M1-1-89	Hinge Pin	M6-509	Universal Gear Case
M1-1-90	Knob	M6-510	Universal Gear Case
M1-1-91	Spining	M6-511	Universal Gear Case
M1-1-92	Thrust Nut (3 Req'd)	M6-512	Universal Gear Case
M1-1-93	Motor Base Bolt	M6-513	Universal Gear Case
M1-1-94	3 1/6" Steel Ball	M6-514	Universal Gear Case
M1-1-95	Switch Cord	M6-515	Universal Gear Case
M1-1-96	1/8" Steel Ball	M6-516	Universal Gear Case
M1-1-97	Switch Insulator	M6-517	Universal Gear Case
M1-1-98	Spindle Back Gear — Large	M6-518	Universal Gear Case
M1-1-99	Back Gear — with Bushing (2 Req'd)	M6-519	Universal Gear Case
M1-1-100	Arbor Support Bearing (2 Req'd)	M6-520	Universal Gear Case
M1-1-101	Back Gear Bushing (2 Req'd)	M6-521	Universal Gear Case
M1-1-102	Back Gear Shaft	M6-522	Universal Gear Case
M1-1-103	Back Gear Eccentric — Right	M6-523	Universal Gear Case
M1-1-104	Back Gear Eccentric — Left	M6-524	Universal Gear Case
M1-1-105	Back Gear Set Collar (2 Req'd)	M6-525	Universal Gear Case
M1-1-106	Back Gear Plunger	M6-526	Universal Gear Case
M1-1-107	Back Gear Lock	M6-527	Universal Gear Case
M1-1-108	Back Gear Plunger Spring	M6-528	Universal Gear Case
M1-1-109	Arbor Support Arm Lock (2 Req'd)	M6-529	Universal Gear Case
M1-1-110	Lift Shaft Bearing—with Bushing	M6-530	Universal Gear Case
M1-1-111	Lift Shaft Handle (2 Req'd)	M6-531	Universal Gear Case
M1-1-112	Rocker Shaft Handle	M6-532	Universal Gear Case
MI HAND LEVER FEED MODEL			
M1-258	Spindle Pulley Bushing	M6-101-48	Table
M1-259	Spindle Pulley	M6-101-49	Knee
10D-262	Ball Crank Nut (2 Req'd)	M6-101-50	Lever
M1-266	Flexible Conduit — 24" Long	M6-101-51	Feed
M1-268	Oiler	M6-101-52	Block
M1-270	1/4"-18 Sq. Hd. Pipe Plug	M6-101-53	Stop
M6-312	Double End Wrench (Not Illus.)	M6-101-54	Nut
9-424C	T. & B Connector	M6-101-55	Toggle
M6-318	Countershaft Pulley — 2 Step	M6-101-56	Collar
M6-427	Motor Pulley	M6-101-57	Spring
M6-428	Oiler (2 Req'd)	M6-101-58	Yoke
M6-429	Countershaft Spindle Collar (2 Req'd)	M6-101-59	Handle
M6-430	Knob	M6-101-60	Shaft
M6-431	Allen Wrench (Not Illus.)	M6-101-61	Washer
M6-432	No. 8-32 Allen Wrench (Not Illus.)	M6-101-62	Base
M6-433	Wrench (2 Req'd)	M6-101-63	Cover
M6-434	Reverse Tumbler Knob	M6-101-64	Rack
M6-435	Window	M6-101-65	Table
M6-436	Guard Hinge Pin	M6-101-66	Knee
M6-437	Lever Wheel Pin	M6-101-67	Feed
M6-438	Reverse Tumbler	M6-101-68	Block
M6-439	Plunger Spring (2 Req'd)	M6-101-69	Stop
M6-440	Compound Gear Bushing (2 Req'd)	M6-101-70	Nut
M6-441	Driver Gear Stud Collar	M6-101-71	Toggle
M6-442	Change Gear Washer (9 Req'd)	M6-101-72	Collar
M6-443	Collar	M6-101-73	Spring
M6-444	Drive Toggle Collar	M6-101-74	Yoke
M6-445	Gear Guard (Inner)	M6-101-75	Handle
M6-446	Change Gear Washer (9 Req'd)	M6-101-76	Shaft
M6-447	Driver Gear Stud	M6-101-77	Washer
M6-448	Change Gear (3 Req'd)	M6-101-78	Base
M6-449	Driver Gear	M6-101-79	Cover
M6-450	Reverse Gear	M6-101-80	Table
M6-451	Change Gear	M6-101-81	Knee
M6-452	Reverse Gear	M6-101-82	Feed
M6-453	Mitre and Spur Gear	M6-101-83	Block
M6-454	Mitre Gear	M6-101-84	Stop
M6-455	Mitre and Spur Gear Stud	M6-101-85	Toggle
M6-456	Universal Scope (Large)	M6-101-86	Collar
M6-457	Universal Scope (Small)	M6-101-87	Spring
M6-458	All Parts the same as for the MI Standard Model, except for following:	M6-101-88	All Parts the same as for the MI Standard Model, except for following:
M6-459	All Parts the same as for the MI Standard Model, except for following:	M6-101-89	All Parts the same as for the MI Standard Model, except for following:
M6-460	All Parts the same as for the MI Standard Model, except for following:	M6-101-90	All Parts the same as for the MI Standard Model, except for following:
M6-461	All Parts the same as for the MI Standard Model, except for following:	M6-101-91	All Parts the same as for the MI Standard Model, except for following:
M6-462	All Parts the same as for the MI Standard Model, except for following:	M6-101-92	All Parts the same as for the MI Standard Model, except for following:
M6-463	All Parts the same as for the MI Standard Model, except for following:	M6-101-93	All Parts the same as for the MI Standard Model, except for following:
M6-464	All Parts the same as for the MI Standard Model, except for following:	M6-101-94	All Parts the same as for the MI Standard Model, except for following:
M6-465	All Parts the same as for the MI Standard Model, except for following:	M6-101-95	All Parts the same as for the MI Standard Model, except for following:
M6-466	All Parts the same as for the MI Standard Model, except for following:	M6-101-96	All Parts the same as for the MI Standard Model, except for following:
M6-467	All Parts the same as for the MI Standard Model, except for following:	M6-101-97	All Parts the same as for the MI Standard Model, except for following:
M6-468	All Parts the same as for the MI Standard Model, except for following:	M6-101-98	All Parts the same as for the MI Standard Model, except for following:
M6-469	All Parts the same as for the MI Standard Model, except for following:	M6-101-99	All Parts the same as for the MI Standard Model, except for following:
M6-470	All Parts the same as for the MI Standard Model, except for following:	M6-101-100	All Parts the same as for the MI Standard Model, except for following:
M6-471	All Parts the same as for the MI Standard Model, except for following:	M6-101-101	All Parts the same as for the MI Standard Model, except for following:
M6-472	All Parts the same as for the MI Standard Model, except for following:	M6-101-102	All Parts the same as for the MI Standard Model, except for following:
M6-473	All Parts the same as for the MI Standard Model, except for following:	M6-101-103	All Parts the same as for the MI Standard Model, except for following:
M6-474	All Parts the same as for the MI Standard Model, except for following:	M6-101-104	All Parts the same as for the MI Standard Model, except for following:
M6-475	All Parts the same as for the MI Standard Model, except for following:	M6-101-105	All Parts the same as for the MI Standard Model, except for following:
M6-476	All Parts the same as for the MI Standard Model, except for following:	M6-101-106	All Parts the same as for the MI Standard Model, except for following:
M6-477	All Parts the same as for the MI Standard Model, except for following:	M6-101-107	All Parts the same as for the MI Standard Model, except for following:
M6-478	All Parts the same as for the MI Standard Model, except for following:	M6-101-108	All Parts the same as for the MI Standard Model, except for following:
M6-479	All Parts the same as for the MI Standard Model, except for following:	M6-101-109	All Parts the same as for the MI Standard Model, except for following:
M6-480	All Parts the same as for the MI Standard Model, except for following:	M6-101-110	All Parts the same as for the MI Standard Model, except for following:
M6-481	All Parts the same as for the MI Standard Model, except for following:	M6-101-111	All Parts the same as for the MI Standard Model, except for following:
M6-482	All Parts the same as for the MI Standard Model, except for following:	M6-101-112	All Parts the same as for the MI Standard Model, except for following:
M6-483	All Parts the same as for the MI Standard Model, except for following:	M6-101-113	All Parts the same as for the MI Standard Model, except for following:
M6-484	All Parts the same as for the MI Standard Model, except for following:	M6-101-114	All Parts the same as for the MI Standard Model, except for following:
M6-485	All Parts the same as for the MI Standard Model, except for following:	M6-101-115	All Parts the same as for the MI Standard Model, except for following:
M6-486	All Parts the same as for the MI Standard Model, except for following:	M6-101-116	All Parts the same as for the MI Standard Model, except for following:
M6-487	All Parts the same as for the MI Standard Model, except for following:	M6-101-117	All Parts the same as for the MI Standard Model, except for following:
M6-488	All Parts the same as for the MI Standard Model, except for following:	M6-101-118	All Parts the same as for the MI Standard Model, except for following:
M6-489	All Parts the same as for the MI Standard Model, except for following:	M6-101-119	All Parts the same as for the MI Standard Model, except for following:
M6-490	All Parts the same as for the MI Standard Model, except for following:	M6-101-120	All Parts the same as for the MI Standard Model, except for following:
M6-491	All Parts the same as for the MI Standard Model, except for following:	M6-101-121	All Parts the same as for the MI Standard Model, except for following:
M6-492	All Parts the same as for the MI Standard Model, except for following:	M6-101-122	All Parts the same as for the MI Standard Model, except for following:
M6-493	All Parts the same as for the MI Standard Model, except for following:	M6-101-123	All Parts the same as for the MI Standard Model, except for following:
M6-494	All Parts the same as for the MI Standard Model, except for following:	M6-101-124	All Parts the same as for the MI Standard Model, except for following:
M6-495	All Parts the same as for the MI Standard Model, except for following:	M6-101-125	All Parts the same as for the MI Standard Model, except for following:
M6-496	All Parts the same as for the MI Standard Model, except for following:	M6-101-126	All Parts the same as for the MI Standard Model, except for following:
M6-497	All Parts the same as for the MI Standard Model, except for following:	M6-101-127	All Parts the same as for the MI Standard Model, except for following:
M6-498	All Parts the same as for the MI Standard Model, except for following:	M6-101-128	All Parts the same as for the MI Standard Model, except for following:
M6-499	All Parts the same as for the MI Standard Model, except for following:	M6-101-129	All Parts the same as for the MI Standard Model, except for following:
M6-500	All Parts the same as for the MI Standard Model, except for following:	M6-101-130	All Parts the same as for the MI Standard Model, except for following:
M6-501	All Parts the same as for the MI Standard Model, except for following:	M6-101-131	All Parts the same as for the MI Standard Model, except for following:
M6-502	All Parts the same as for the MI Standard Model, except for following:	M6-101-132	All Parts the same as for the MI Standard Model, except for following:
M6-503	All Parts the same as for the MI Standard Model, except for following:	M6-101-133	All Parts the same as for the MI Standard Model, except for following:
M6-504	All Parts the same as for the MI Standard Model, except for following:	M6-101-134	All Parts the same as for the MI Standard Model, except for following:
M6-505	All Parts the same as for the MI Standard Model, except for following:	M6-101-135	All Parts the same as for the MI Standard Model, except for following:
M6-506	All Parts the same as for the MI Standard Model, except for following:	M6-101-136	All Parts the same as for the MI Standard Model, except for following:
M6-507	All Parts the same as for the MI Standard Model, except for following:	M6-101-137	All Parts the same as for the MI Standard Model, except for following:
M6-508	All Parts the same as for the MI Standard Model, except for following:	M6-101-138	All Parts the same as for the MI Standard Model, except for following:
M6-509	All Parts the same as for the MI Standard Model, except for following:	M6-101-139	All Parts the same as for the MI Standard Model, except for following:
M6-510	All Parts the same as for the MI Standard Model, except for following:	M6-101-140	All Parts the same as for the MI Standard Model, except for following:
M6-511	All Parts the same as for the MI Standard Model, except for following:	M6-101-141	All Parts the same as for the MI Standard Model, except for following:
M6-512	All Parts the same as for the MI Standard Model, except for following:	M6-101-142	All Parts the same as for the MI Standard Model, except for following:
M6-513	All Parts the same as for the MI Standard Model, except for following:	M6-101-143	All Parts the same as for the MI Standard Model, except for following:
M6-514	All Parts the same as for the MI Standard Model, except for following:	M6-101-144	All Parts the same as for the MI Standard Model, except for following:
M6-515	All Parts the same as for the MI Standard Model, except for following:	M6-101-145	All Parts the same as for the MI Standard Model, except for following:
M6-516	All Parts the same as for the MI Standard Model, except for following:	M6-101-146	All Parts the same as for the MI Standard Model, except for following:
M6-517	All Parts the same as for the MI Standard Model, except for following:	M6-101-147	All Parts the same as for the MI Standard Model, except for following:
M6-518	All Parts the same as for the MI Standard Model, except for following:	M6-101-148	All Parts the same as for the MI Standard Model, except for following:
M6-519	All Parts the same as for the MI Standard Model, except for following:	M6-101-149	All Parts the same as for the MI Standard Model, except for following:
M6-520	All Parts the same as for the MI Standard Model, except for following:	M6-101-150	All Parts the same as for the MI Standard Model, except for following:
M6-521	All Parts the same as for the MI Standard Model, except for following:	M6-101-151	All Parts the same as for the MI Standard Model, except for following:
M6-522	All Parts the same as for the MI Standard Model, except for following:	M6-101-152	All Parts the same as for the MI Standard Model, except for following:
M6-523	All Parts the same as for the MI Standard Model, except for following:	M6-101-153	All Parts the same as for the MI Standard Model, except for following:
M6-524	All Parts the same as for the MI Standard Model, except for following:	M6-101-154	All Parts the same as for the MI Standard Model, except for following:
M6-525	All Parts the same as for the MI Standard Model, except for following:	M6-101-155	All Parts the same as for the MI Standard Model, except for following:
M6-526	All Parts the same as for the MI Standard Model, except for following:	M6-101-156	All Parts the same as for the MI Standard Model, except for following:
M6-527	All Parts the same as for the MI Standard Model, except for following:	M6-101-157	All Parts the same as for the MI Standard Model, except for following:
M6-528	All Parts the same as for the MI Standard Model, except for following:	M6-101-158	All Parts the same as for the MI Standard Model, except for following:
M6-529	All Parts the same as for the MI Standard Model, except for following:	M6-101-159	All Parts the same as for the MI Standard Model, except for following:
M6-530	All Parts the same as for the MI Standard Model, except for following:	M6-101-160	All Parts the same as for the MI Standard Model, except for following:
M6-531	All Parts the same as for the MI Standard Model, except for following:	M6-101-161	All Parts the same as for the MI Standard Model, except for following:
M6-532	All Parts the same as for the MI Standard Model, except for following:	M6-101-162	All Parts the same as for the MI Standard Model, except for following:
M6-533	All Parts the same as for the MI Standard Model, except for following:	M6-101-163	All Parts the same as for the MI Standard Model, except for following:
M6-534	All Parts the same as for the MI Standard Model, except for following:	M6-101-164	All Parts the same as for the MI Standard Model, except for following:
M6-535	All Parts the same as for the MI Standard Model, except for following:	M6-101-165	All Parts the same as for the MI Standard Model, except for following:
M6-536	All Parts the same as for the MI Standard Model, except for following:	M6-101-166	All Parts the same as for the MI Standard Model, except for following:
M6-537	All Parts the same as for the MI Standard Model, except for following:	M6-101-167	All Parts the same as for the MI Standard Model, except for following:
M6-538	All Parts the same as for the MI Standard Model, except for following:	M6-101-168	All Parts the same as for the MI Standard Model, except for following:
M6-539	All Parts the same as for the MI Standard Model, except for following:	M6-101-169	All Parts the same as for the MI Standard Model, except for following:
M6-540	All Parts the same as for the MI Standard Model, except for following:	M6-101-170	All Parts the same as for the MI Standard Model, except for following:
M6-541	All Parts the same as for the MI Standard Model, except for following:	M6-101-171	All Parts the same as for the MI Standard Model, except for following:
M6-542	All Parts		

Parts on this page are for milling machines serial number 005466 to 008123. Other parts for these machines are shown on pages 2 thru 8.

